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FACTORY

MANAGEMENT AND MAINTENANCE

MAY 1947

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FACTORY
MANAGEMENT AND MAINTENANCE

L. C. MORROW, EDITOR

CUT PRICES? YES BUT NOT INDUSTRY ALONE

President Truman has demanded that industry reduce the prices of its goods. Unless prices are brought down, he has said, labor will be justified in pressing its demands for a second round of wage increases.

Possibly industry should cut prices. But before extensive pressure is brought to bear on industry, facts about prices and related matters should be considered.

The prices of industrial products (including food products) have gone up 54.5 per cent since 1939. During the same period prices of the raw materials industry buys went up 135 per cent. Unit labor costs went up 65 per cent.

Farm prices have gone up 180 per cent in comparison with the average farm prices of 1935-39.

Hourly wages have gone up 70.6 per cent since January, 1941.

Profits (after taxes) of industry (1155 manufacturing corporations) have varied from 7.6 per cent of sales in 1936 to 3.3 per cent in 1944, and were 6 per cent in 1946.

Industry should examine its prices. Where it can, it should follow the action of Ford, Plymouth, and International Harvester. Those companies recognize that it is much better for prices to be lowered voluntarily by manufacturers than to be forced down by buyers' "strikes."

A year ago prices could not be lowered. Production was down because reconversion had not been completed. And it was being kept low by strikes. The strikes were for the purpose of securing higher wages—an accomplishment bound to force prices up because of the low production.

Today production is high and increasing. Corporate profits for the first quarter, with production and prices remaining at present levels, apparently were at least as good as in the final quarter of 1946.

But labor's prices obviously are going to go up. Because the cost of labor is so large a portion of the total cost of industry's products, the relationship of wages to prices cannot be overlooked. The higher they go, the more difficult it will be for the prices of industry's products to be brought down.

The logical procedure would be to retain the *status quo* until volume of production and competition acted to bring prices down. But in view of probable public opinion and possible buyers' strikes it seems that somebody must break the spiral. The actual move into the realm of lower prices, if made, undoubtedly will have to be made by industry.

The reductions that industry can make will have to come principally from the consumer goods manufacturers. Actually, they will not greatly improve the purchasing power of most buyers. That is because farm products, which make up so much of the cost of living, are so highly priced. But the psychological effect would be worth while. In fact, it might mean the difference between a continuation of good business and that "recession" so freely predicted for the latter part of this year.

There would be another advantage to price reductions. They would stimulate the search for more economical production methods. To the extent that price reductions not otherwise supportable could come out of lower production costs, industry would have demonstrated again the success of the American way of "more goods for more people at lower prices."

L. C. Morrow

ARE FOREMEN REALLY MANAGEMENT?

'Yes'—say these findings from a* Factory *survey of industry

- ***Foremen's standing under management policies improved during the war—and has improved again since***

- ***Most of the companies surveyed choose their plant executives from among foremen — and give foremen definite privileges***

- ***Foremen make the key decisions as to who is hired, discharged, laid off, or transferred***

- ***Foremen's prestige—as measured by their effectiveness in handling grievances — slipped during war, is recovering rapidly***

- ***Foremen's differential in pay over the highest-paid men under them, in the companies covered, is about the same as it was in 1939***

Foremen are getting more recognition as important members of the management team than they have ever had.

This is the chief conclusion of a Factory survey of 72 representative industrial plants. It is shown in the improved policies concerning foremen and in the opinions expressed by top management executives in this review of the changes in foremen's standing in the eight years since 1939.

Limited to Foremen

Made in the two weeks after the Supreme Court upheld bargaining rights for foremen in the Packard case, the survey includes plants ranging in size from fewer than 100 employees to 25,000. The plants are proportionately representative of the major classifications of industry. They are distributed geographically through the industrial areas roughly in proportion to their industrial importance.

In making the survey, Factory limited it to supervisory employees definitely considered part of management—that is, general foremen, foremen, and assistant foremen. Straw bosses, gang leaders, lead men, and other semi-supervisory employees were not included. Companies covered in the survey have 4016 of these foremen, supervising some 73,000 production workers. The average number of workers su-

pervised by each foremen is 18.2.

The survey reveals:

1. Standing. The foremen's standing, as it is affected by ten major industrial relations policies, had improved in 1944 over 1939 and has improved again since the end of the war. Only slump in 1947 figures over 1944 is in foremen's training. The number of companies giving foreman training courses has fallen slightly from its wartime peak.

2. Promotions. Foremen in most of the 72 plants can look forward to promotion to plant executive positions. They have definite privileges not enjoyed by production workers.

3. Authority. Despite talk of "undermining" foremen's authority, most foremen have a veto over job applicants, can reject men who turn out to be unsatisfactory during trial periods, can discharge for cause, can have men transferred, and make key decisions when layoffs are necessary.

4. Prestige. Although foremen's prestige may have slipped during the war, it is fast being recovered. Reports show that foremen hear and settle more grievances than they did in 1944, and almost as many as they did in 1939.

5. Compensation. Despite sharp gains in wages by rank-and-file workers, the average differential in pay between foreman and the highest-paid production worker reporting to him—in the 72 companies—is just about what it was in 1939. It is now 26.5 per cent.

Foremen did not stand still in the years following 1939 while unions penetrated the manufacturing industries, while the country went to war, while management developed a whole new set of labor relations techniques and tools, and while industry expanded capacity to meet the needs of war and peace.

Foremen's gains, of course, have not been uniform in all companies. Some companies have done little as yet about the grievances that are turning foremen toward unions. But attitudes toward foremen have changed.

How great this change is, is shown

HOW THE FOREMEN'S STATUS IN MANAGEMENT HAS IMPROVED

QUESTION NUMBER		NUMBER OF RESPONDENTS	NUMBER ANSWERING "YES"		
			IN 1947	IN 1944	IN 1939
1.	Are foremen's salaries determined by job evaluation?	70	41	30	19
2.	Are foremen rated periodically by a merit system?	72	23	15	8
3.	Are foremen's duties and responsibilities in your plant clearly defined and classified?	71	63	51	40
4.	Do you conduct training courses for foremen?	71	30	32	12
5.	Are foremen told as soon as stewards are told of grievance committee decisions, changes in policies, and developments in labor negotiations?	48	46	36	28
6.	Do foremen have scheduled meetings with their superiors to discuss problems and policies?	71	58	48	30
7.	Are foremen consulted in determining industrial relations policies?	69	58	42	31
8.	Do you have clearly defined channels for contact between foremen and top plant executives?	67	65	54	44
9.	Is there an established system in your plant to hear and handle foremen's own grievances?	69	34	27	23
10.	Does your company have an established seniority system or policy for foremen?	67	15	12	10
11.	Do your foremen, if returned to the ranks, regain their seniority among production workers?	54	44	40	36

in the response to FACTORY's questions on policies that closely affect foremen. The number of companies among the 72 surveyed that use job evaluation methods in determining foremen's compensation increased from 19 to 41 in the eight years. The number using merit systems to rate foremen regularly has climbed from 8 to 23. The number conducting training courses has risen from 12 to 30, although it reached 32 in 1944 when wartime training plans were operating near their peak.

Policies Changing

More than one-half of the companies answering the questions have in force seven of the eleven policies closely concerning foremen (see table on page 67).

The seven policies in force in more than half the companies are job evaluation, clear definition and classification of foremen's duties and responsibilities, meetings scheduled between foremen and higher executives for discussion of policies and problems, consulting foremen on industrial relations policies, protecting seniority of foremen who must be returned to the ranks, establishing channels for contact between foremen and top executives, and informing foremen quickly of changes in labor relations matters.

Merit rating, formal channels to hear and act on foremen's own grievances, and seniority systems for foremen are used in only a minority of the 72 companies. Merit rating is still considered experimental in many companies. Grievance and seniority systems are frequently listed demands of foremen's unions, but many companies apparently rely on informal methods and the close contact between foremen and plant executives to take care of such problems.

Promote From Within

Only one, lone, medium-sized plant, of 71 that answered the question, goes outside the company to find foremen. The other 70 promote from the ranks. Most of them, too, rely on informal rating by executives to select their new supervisors. Aptitude and intelligence tests and merit rating are used in combination with the rating-by-superiors plan in a few companies.

FOREMEN CAN STEP UP TO EXECUTIVE JOBS

QUESTION NUMBER		NUMBER OF RESPONDENTS	NUMBER ANSWERING "YES"	
12.	Are plant executive positions (general foreman, superintendent, works manager, etc.) usually filled from the ranks of foremen?	70	56	
13.	Are your foremen usually selected from among rank-and-file workers?	71	70	
14.	How are your foremen selected?	71		
	• By informal rating or by superior executives?		65*	
	• By aptitude and intelligence tests?		11	
	• By merit rating?		11	
15.	Do your foremen have parking, locker, and washroom facilities separate from those of production workers?	69	13	
16.	Do your foremen punch time clocks?	72	32	
	Do production workers punch time clocks?	72	65	
			HAVE OWN	CAN SHARE
17.	Do most of your foremen have their own office, etc., or do they merely have the use of these facilities available to them?	71		
	• Office		32	36
	• Telephone		45	26
	• Desk		57	14
	• Clerical Help		22	44

*Because some executives answered more than one part of the question, total responses are greater than the number of companies answering

MOST FOREMEN STEER CLEAR OF UNIONS

QUESTION NUMBER		NUMBER OF RESPONDENTS	NUMBER ANSWERING "YES"
18.	Do foremen advanced from the ranks give up their union membership?	45	36
19.	Do your foremen belong to a workers' union?	69	6
20.	Do they belong to a foremen's union?	71	1
21.	If they belong to a foremen's union, is the group active or inactive?	1	
	Active		
	Inactive		1

A heavy majority of the plants fill executive jobs in the plant, such as works manager and superintendent, from the group of foremen.

Although prestige factors favoring foremen are difficult to measure, FACTORY'S survey shows that most foremen have their own desks and telephones. Thirty-two of the companies report that most of their foremen have their own offices, and 22 give foremen their own clerical help. Foremen in the plants with more than 250 employees stand a better chance than their fellows in smaller plants of having an office of their own and clerical assistants assigned to them. They are also more apt to have parking, locker, and washroom facilities separate from those of production workers. This was reported in only 13 companies, however, and comment indicated that some managements planned to have the two groups use the same facilities.

Foremen Get a Break at Clocks

When it comes to punching time clocks, foremen do get a break. Production workers punch in and out in 65 of the 72 companies, foremen in only 32 of them.

Staff specialists, such as personnel men, have reduced the area in which foremen once had unlimited authority. In very few plants can a foreman now go out on the streets and pick up recruits for his gang. But foremen still have substantial authority. In 60 plants they have a "yes or no" over job seekers sent them from the personnel department. In 68 plants foremen can reject men who are hired for trial periods. Incidentally, foremen in small plants—plants with fewer than 100 employees—have more authority in hiring than do their counterparts in large plants.

Foremen, too, make the important decisions in reducing their working forces. Thirty-six companies, one-half of those polled, give foremen authority to fire a man outright. In 56 companies, they can fire for cause, although their authority in discharging is frequently limited by conditions written into union contracts. When layoffs are necessary, a majority of the companies, 43 of them, allow foremen to make the decisions. They are at least consulted on layoffs in 58 companies. And in 60 companies foremen can have men transferred if they prove to be unsatisfactory. The foremen frequently must arrange with their superintendents to put transfers through, but the "super" usually follows the foreman's lead.

Recovering Prestige

That wartime confusion, the impact of union organizing drives, and the inflow of new, untrained workers were reflected in foremen's standing is shown in the averaging of grievance reports. In 1939, the last "normal" year, foremen settled 80 per cent of the grievances coming their way. By 1944, the figure dropped to 59 per cent. Now it is just above 77 per cent.

The average number of grievances brought to foremen first, rather than to union stewards, falls into a similar pattern. From a high just under 70 per cent in 1939, it fell to 59.5 per cent, has now picked up to 65 per cent. Perhaps as good a yardstick as there could be for measuring foremen's prestige among workers, these two indicators show foremen rapidly regaining influence they may have lost.

Pay Differential Holds

One important source of foremen's complaints during the war years has apparently been reduced. All but a few foremen have a differential in pay large enough so that they make more than the highest-paid men reporting to them. The average differential in 1939, in the 68 companies reporting on this question, was 27 per cent. During the early war years when government regulations held back salaries while overtime boosted wages, it probably fell well below that. By 1944, however, it was back to 26 per cent, now is 26.5 per cent.

The range of the differentials among companies, however, is comparatively large. One company reports that its foremen had no edge in pay over the highly skilled working under them. Four say it is

FOREMEN HAVE A REAL SAY IN HIRING AND FIRING

QUESTION NUMBER		NUMBER OF RESPONDENTS	NUMBER ANSWERING "YES"		
22.	What authority do your foremen have in hiring?	72			
	• Do they hire on their own authority?		17*		
	• Do they approve or disapprove applicants referred to them?		60		
	• Do they merely recommend rejection?		20		
	• If men are hired for trial periods, can foremen reject those who are unsatisfactory?		68		
23.	What authority do your foremen have in discharging?	72			
	• Can they discharge outright?		36*		
	• Can they discharge for cause?		56		
	• Do they merely recommend discharge?		20		
	• Do they lay workers off when necessary?		43		
	• Do they recommend those to be laid off?		46		
	• Are they consulted on layoffs?		58		
	• Can they have men transferred if they are unsatisfactory?		60		
			NUMBER ANSWERING "YES"		
			IN 1947	IN 1944	IN 1939
24.	Approximately what percentage of grievances are settled at the foreman's level?	60	77.3%	59%	80%
25.	What percentage of grievances are brought to foremen first, rather than to stewards?	38	65%	59.5%	69.6%

*Because some executives answered more than one part of these questions, total responses are greater than the number of companies answering

between 4 and 10 per cent. The greatest number of companies have 15 to 35 per cent differences. But four companies report the foreman's advantage in pay at between 75 and 100 per cent.

Along with higher pay, foremen get longer vacations than workers in 32 of the 72 companies and more generous sick leave policies in 40. They have the same paid vacations in 40 companies, the same paid sick leave in 17. Policies on sick leaves are not as concrete as are vacation policies, many companies saying that foremen have "indefinite" or "reasonable" sick leaves with pay.

The number of plants in the nation with unionized foremen is small; consequently only a small proportion of those covered in FACTORY's survey have foremen who are organized. But the survey reveals some interesting points concerning them. Five of the seven plants where foremen are members of either a workers' union or foremen's union use job evaluation methods in determining salaries; schedule meetings of foremen and higher executives to go over problems; consult foremen on industrial relations policies; and promote foremen to plant executive positions. Six of them say foremen's duties and responsibilities are clearly defined and classified, and that foremen have well-defined channels for contact with top management. In all seven of the plants, foremen are informed of developments in labor relations at least as soon as stewards are told, and foremen regain their seniority among production workers if they are returned to the ranks.

Effects of Union

Since the items just mentioned are frequently demands of unionized foremen, apparently organized foremen in these companies have been successful in getting action on these problems, whether it was done in formal negotiation or not.

Backing up these survey findings of management's direct efforts to insure the continuing loyalty of foremen are an increasing number of reports from individual companies. Research in foreman-management relations, information

programs, and training plans for foremen are being expanded in a wide range of companies. American Rolling Mill, Standard Oil of New Jersey, Consolidated Vultee Aircraft, Thompson Products, and Minnesota Mining & Manufacturing are only a few of them.

Pointing up the need for a full-scale review of foremen's pay and problems in many plants is the Supreme Court decision in the Packard case assuring foremen bargaining rights. Adding urgency is the all-out organizing drive started by the independent foremen's union, the Foreman's Association of America, which began soon after the Court's decision was announced.

The decision alone was enough to activate foremen's locals which had been dormant in at least two plants. Unless Congress clarifies the ambiguous wording of the National Labor Relations Act to deny bargaining rights to supervisory employees, the FAA may add thousands of members to the 33,000 it now has

How important the problem can be is shown in the announcement that the Ford Motor Company is terminating its contract with the foremen's union. After pointing out that the company had voluntarily signed an agreement with the FAA in 1944 in order to give the union a practical test, the company detailed results that have been the opposite of what was hoped for. In concluding his letter terminating the contract, John S. Bugas, director of industrial relations, said: "We are giving you this notice of termination of our agreement for the practical reason that it has not worked under test."

That foremen are regaining prestige and gaining more recognition under management policies, however, is shown in this FACTORY survey. The combination, plus the encouragement of top executives, has been enough in the past to swing union-conscious foremen into management-minded groups.

And that not all foremen would join unions is shown, emphatically, at the Watervliet, N. Y., plant of Allegheny Ludlum Steel. The plant's entire supervisory staff, shortly after the Court upheld bargaining rights for foremen, signed and presented to the company's president a statement opposing their own unionization.

The resolution read: "In view of the recent Supreme Court decision in the Packard case, we the managers, department managers, assistant managers, superintendents, and foremen, constituting the management of the Watervliet plant, confirm our belief that the unionization of management is not consistent with the best interests of the corporation."

HOW FOREMEN'S CLUBS ARE HELPING FOREMEN

Along with in-plant efforts to swing foremen once again to its team, management is working more closely with the various foremen's organizations.

Newest of the organizations is the Foremen's League for Education and Association, a recently revived non-profit corporation in Dayton. With the aim of "fostering proficiency in foremanship through education, literature, and association," it is concentrating on three objectives. One, it is informing manage-

FOREMEN DO GET A PAY DIFFERENTIAL

QUESTION NUMBER		NUMBER OF RESPONDENTS	NUMBER ANSWERING "YES"		
26.	What is the average differential in pay between foreman and the highest-paid production worker reporting to him? (Stated as percentage of the latter's pay)	68	IN 1947 26.5%	IN 1944 26%	IN 1939 27%
27.	How long are foremen's paid vacations? How long are production workers' paid vacations?	71	FOREMEN	PRODUCTION WORKERS	
	• None		2	5	
	• One week		4	6	
	• One to two weeks, depending on length of service		8	35	
	• Two weeks		50	22	
	• More than two weeks		7	2	
	• Not answered, in part		0	1	

FIFTEEN REASONS WHY FOREMEN JOIN UNIONS

Behind the foreman's turn toward unions are these reasons, says the Foremen's League for Education and Association:

1. **Foremen being taken for granted by some managements**
2. **Lack of understanding by top management of foremen's problems**
3. **Lack of understanding by foremen of top management problems**
4. **Disparities between foremen's responsibility and authority**
5. **Inadequate screening in selecting foremen**
6. **Inadequate training of men for promotion to foremen**
7. **Inadequate continuing training to help foremen measure up to the responsibilities of their positions**
8. **Inadequate wage differentials**
9. **Discontent due to bypassed authority; foremen are squeezed between personnel departments and shop stewards**
10. **Desire for security on the part of foremen not properly qualified to hold their jobs**
11. **The urge to "belong"—arising from the lack of a medium for association and for discussion of problems**
12. **Influence of organized rank-and-file workers in the plant**
13. **Influence of organized foremen in other plants**
14. **Appeals of union organizers**
15. **Impetus given organization by the prevailing construction of the National Labor Relations Act**

ment on foremen's problems and how individual companies are meeting them. Two, it is aiding management on the legislative and legal angles of foremen's problems.

More important, however, is its educational program for foremen. It is sponsoring, in cooperation with the National Association of Foremen, a series of seminars on foremen's problems.

Start Seminars

The first seminar was held in March in the Dayton headquarters of the Association, a long-established foremen's organization. Fifteen foremen from seven companies in the Pittsburgh area dug into and discussed free enterprise, foremen's problems, why foremen turn to unions, and the why and how of setting up foremen's clubs. The clubs, incidentally, have proved highly effective counters to the unionization idea.

The fifteen foremen represented some 8000 supervisors in their home companies. The League and the Association hope that the foremen-students will become key men in developing foremen's clubs in their own plants.

Scheduled to multiply as soon as the first experimental groups have tested and improved the literature, visual aids, and methods used in conferences, the seminars are expected to boost the number of foremen's clubs at a healthy rate.

The clubs, however, are already booming. At least those affiliated with the NAF are. In the last six months, the Association's membership has jumped from 18,000 to 27,000. Eighty-five new clubs have been chartered, making a total of 227. More than 20 years old, NAF has always promoted better foremanship. Two years ago it broadened its aim to include all management men and their problems. Its theme now is "Unity in Management."

Look to Management

Also broadening its objective is the National Council of Foremen, an association of foremen's organizations sponsored by the YMCA. Its rolls today carry 82 affiliated clubs and 26,212 members. Unlike NAF, whose local clubs are usually made up of foremen and executives from individual plants, the Council is made up of "city" clubs which may have representatives of 20 or 30 different companies. Currently the clubs are debating changing their names to make it clear that they are not limited to foremen, but take in representatives of all levels of management.

Both the National Association and the National Council depend more or less on the support of top management. Locals are usually organized with the help of top executives. Companies frequently help arrange programs or otherwise contribute support. Chief value of these programs to members—and to management—is that they are two-way transmission belts for ideas and information. And that function, of course, depends on the degree of interest top management puts in.

* * *

FACTORY'S survey, reports of the programs under way in more and more companies, and the revitalized activities of the national groups, all show that more and more of management recognizes the foreman as an important part of management.

More significant, progressive management is working to see that foremen *know* they are recognized and depended upon as management leaders.

That—not Congress—will in the long run keep foremen and top executives working together on the same team.

SEVEN CONVEYORS IN NEW RETURN COST IN FOUR YEARS

FREDERICK M. BOCK • ASSISTANT WORKS MANAGER, THE WEATHERHEAD COMPANY, CLEVELAND

Yearly savings of close to $100,000 are predicted for a complete overhead conveyor installation at The Weatherhead Company. Recently put into operation, the system links all the integral production processes in three multi-story buildings, and is expected to pay for itself in four years.

In the initial plan, drawn up prior to installation, the conveyor was expected to accomplish the following:

1. Cut costs by performing metal washing, drying, weighing, and bright dipping (in the case of brass) operations automatically for some 30,000 diversified parts.

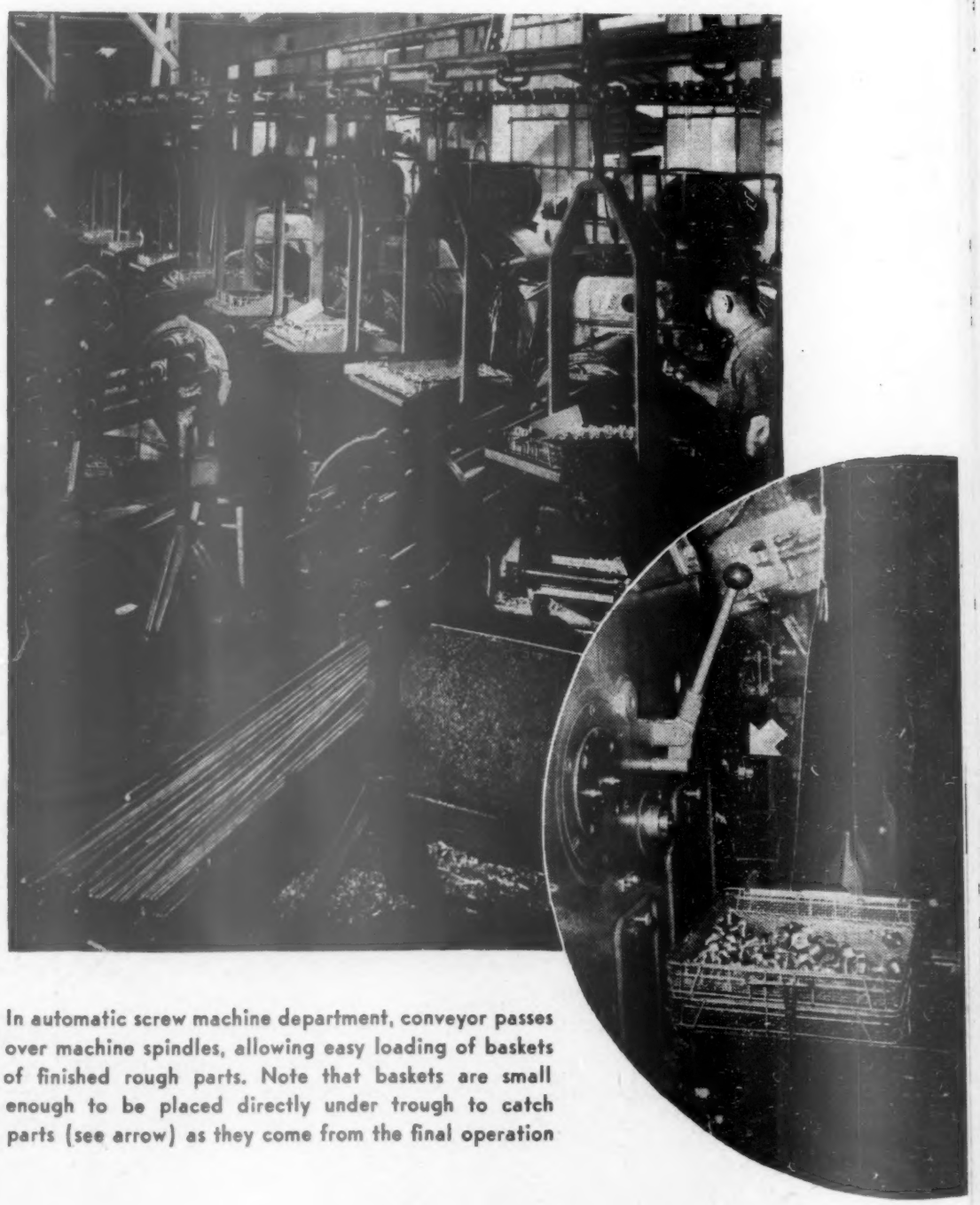
2. Speed up production by moving work out of the department as soon as each basket was completed.

3. Reduce trucking expense and miscellaneous handling.

4. Increase efficiency by releasing floor space, improving housekeeping, and providing better identification of parts.

Among the advantages already apparent are the following:

1. Labor cost of metal washing, drying, and bright dipping operations has been cut 40 per cent. This is made possible by a central washing and bright dipping department



In automatic screw machine department, conveyor passes over machine spindles, allowing easy loading of baskets of finished rough parts. Note that baskets are small enough to be placed directly under trough to catch parts (see arrow) as they come from the final operation

to which material is fed by the conveyors from *all* departments; each formerly had its own metal washing and/or bright dipping equipment, and men to operate it.

2. Number of people hired specifically for trucking purposes has been reduced 29 per cent. All interdepartmental trucking of finished parts has been eliminated.

3. Flow of material throughout the plant is 20 per cent faster. Since material is not accumulated at the machines, awaiting trucks, but rather is placed on the conveyor carrier immediately, over-all processing time is reduced and in work-in-process inventory has been decreased by 20 per cent.

4. Weigh count inaccuracy has decreased from 5 to 1 per cent, mainly by use of uniform wire mesh baskets. When totepans were used, chips, machine oil, and cardboard separators frequently found their way into the bottom of the pan and were weighed in with the finished material. Central weigh-counting has union approval because of the accuracy of payment. Much bickering has been eliminated; charges of inequalities and cheating have evaporated. Such savings are estimated at $1000 per month.

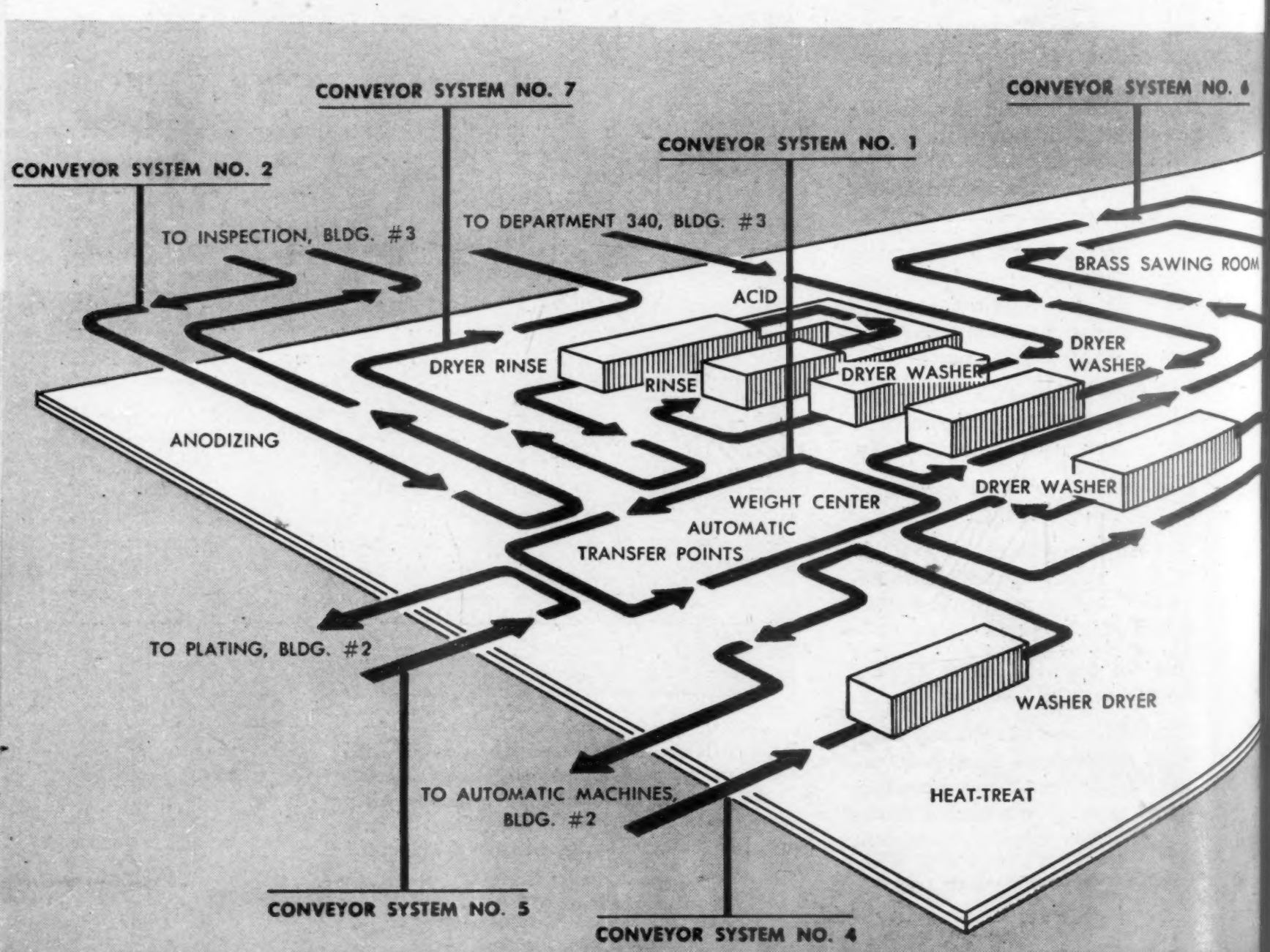
5. Working conditions are pleasanter, since much space within the departments has been cleared of work in process.

6. Expediting is facilitated, and the temporary loss of parts in process is reduced to a minimum since each container is now identified by a separate ticket which remains with the container throughout its processing. Ticket is made of heavy linen paper which is impervious to grease and water. Since all tickets are dated, foremen know how long work has been in their department.

7. Many salvage operations are eliminated, since material no longer becomes nicked in old tumble-type washers. Number of parts damaged in filling old-style tote boxes too full (so that bottoms rested on work when piled) has been reduced.

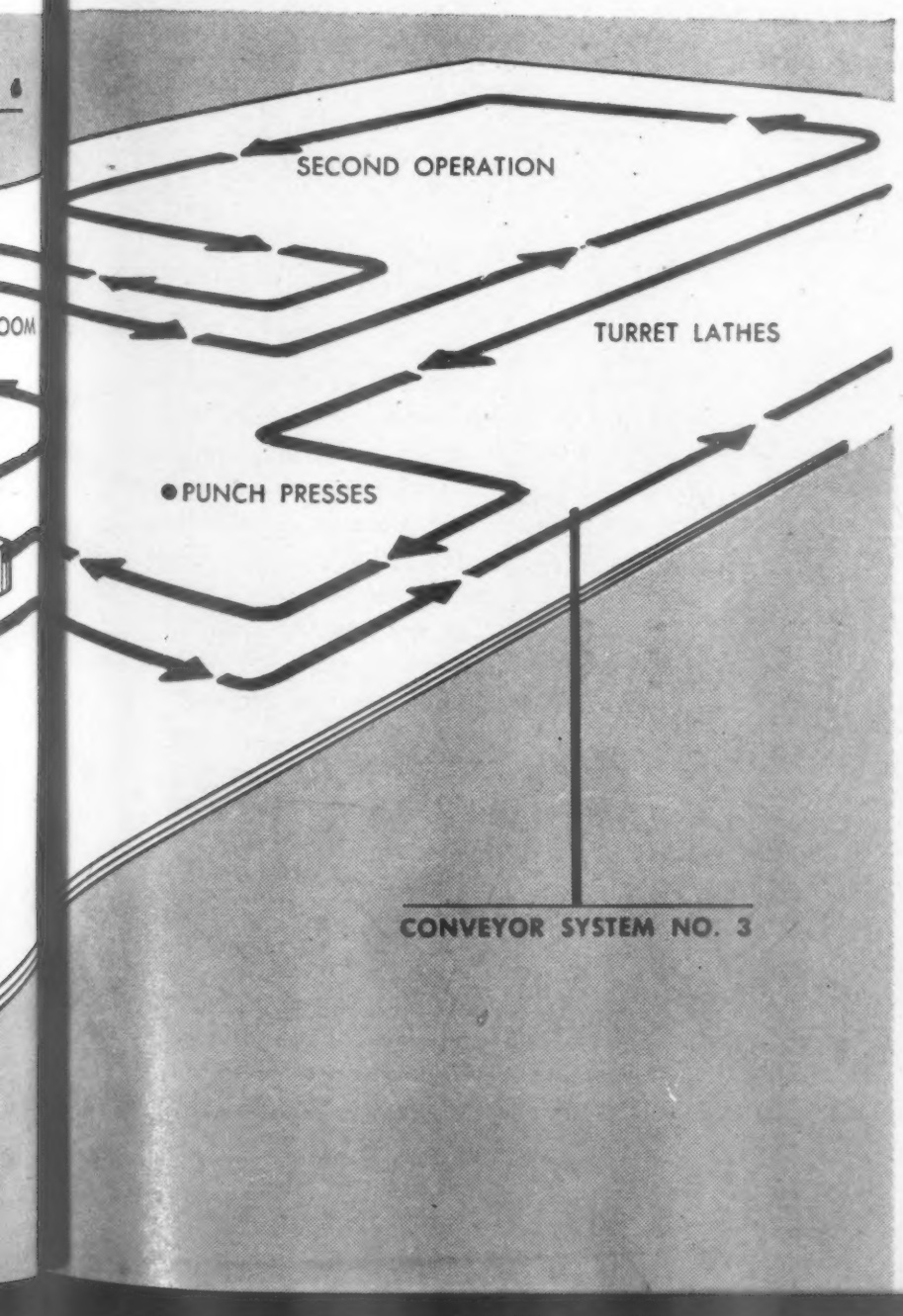
8. Women can safely and easily lift the new basket even when it is loaded. This permits the employment of women on jobs which formerly could be performed only by men. The basket also eliminates "riddling" (cleaning) of a substantial number of parts at the machine by the operator to remove chips. Chips are washed out by new washers. And one type of container throughout the plant offers the advantage of a constant tare weight.

9. The "grand rush" at the end of the shift to get completed work to the weigher so that credit will be received for daily production is eliminated. This formerly posed a serious problem for the material handlers, because they were frequently unequal to handling the large volume of parts put up to them for transportation at shift changes, particularly when aisles were clogged with the incoming and outgoing shifts. No longer is the work of one shift confused with the work of a previous shift that may not have been removed from the machine. At the end of each shift finished materials are merely placed on the conveyor and transported to



Automatic washer removes foreign matter from parts while still on conveyor; strong streams of water are directed at the parts from two directions to effect a quick, complete cleansing

After washing, the parts pass through long heating ovens where they are thoroughly dried. Arrow points to limit switch which stops conveyor if the carrier has been loaded with too many baskets



SEVEN CONVEYORS, TAILORED TO DUTY

SYSTEM NUMBER	OPERATION	LENGTH (FEET)	CARRIERS NUMBER	CARRIERS TYPE
1	Weighing	180	45	Double
2	Inspection	685	171	Double
3	Hand screw	1025	256	Single
4	Automatics	1710	427	Single
5	Plating	500	171	Double
6	Drill presses, grinders, etc.	1560	390	Single
7	Brass fittings	1890	472	Single

Materials are carried through all operations on overhead conveyors. Transfer to successive systems is accomplished by means of automatic switches which connect conveyors 2 through 7 with conveyor number 1

At final transfer point, parts requiring 100 per cent inspection are set aside; those for sampling inspectors are placed on the belt conveyors at the left

the next operation, leaving the machine working space free for the next operator.

10. Combining the weight-count, wash center, and bright dipping operation under a full-time supervisor permits a balanced crew to keep work flowing smoothly and insures that the equipment has constant care. Under the old system, each department had its own weigher and washer, and his temporary absence posed a problem.

11. Movement of finished material into the stockrooms has been simplified by belt conveyors which carry the work to stock from inspection unloading stations.

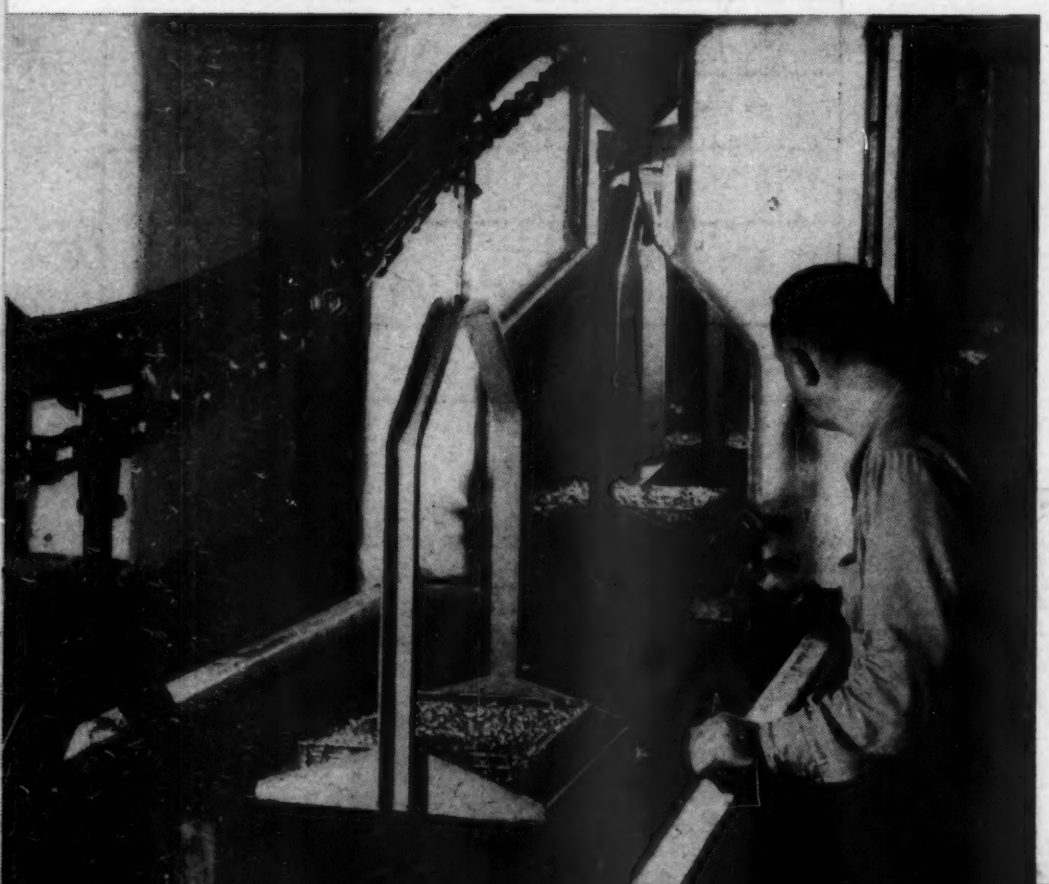
12. Oil dripping, a common nuisance to all automatic screw machine shops, has been almost eliminated because the wire mesh containers rest on a device designed to return the excess oil to the machine reservoir during the period it takes to fill the container with parts. Also, the use of sawdust decreased by 50 per cent, at a saving of $2000 yearly, and reduced the fire hazard proportionally.

Construction Details

The overhead conveyor consists of seven separate sections which link the integrated production processes with the central wash-weigh center. Carriers are spaced on 4-ft. centers and have a maximum capacity of 100 pounds.

To aid in the decision as to the number of carriers required for each conveyor, studies were made of the flow of material from each department on each shift to the then-established weigh and wash centers. These studies were made on the basis of the containers then in use, and results were converted to the equivalent in the new basket-type, 30-lb. containers. Making allowances for expected increases in production, and taking into account the length of conveyor required, results were translated into the required number of single- or double-tray carriers. A special overhead bridge was constructed to carry two double- and two single-tracked conveyors from the wash-weigh center to adjacent buildings.

While the number of baskets required is three times greater than the previously used tote boxes, the baskets are far more efficient than their solid counterparts. The increase in efficiency is not only caused by a decrease in damaged parts. Tote boxes 6 inches high and 9x12 inches in cross section, which contained material weighing approximately 40 pounds, could be stored to a safe height of only 2½ feet—five high. Since the total poundage, 200, covered an area of ¾ square foot, the storage efficiency was 250 pounds per square foot. The 3-in.-high, 15x15-in. cross section baskets, however, can be stored to a safe height of 6 feet. Since this total poundage, 750, covers an area of 1¾ square feet, the storage efficiency is 60 per cent.



After last machine operation, finished brass parts are given an automatic chromatic acid immersion while still on the conveyor

A RECREATION PROGRAM WITH SOMETHING FOR EVERYBODY

W. L. JOHNSON • DIRECTOR OF PERSONNEL AND INDUSTRIAL RELATIONS
BELL & HOWELL COMPANY, CHICAGO

Employees at Bell & Howell write their own recreation ticket. There are recreational facilities at the company for all who care to participate—with something doing the year round.

Activities run all the way from bowling, softball, and golf to picnics, hobby shows, and dances. All are sponsored by the B. & H. Employees Benevolent Association.

BAHEBA's latest acquisition is a 25-acre athletic field adjoining the company's newest plant in Lincolnwood, a Chicago suburb, where all manufacturing will eventually be located. On this tract are a clubhouse, horseshoe courts, tennis courts, volleyball courts, two softball diamonds (one lighted for night use) with bleachers. The ball diamond is the focal point for all local industry. The clubhouse is complete with fireplace, lounge, piano, ping-pong tables, card tables, screened-in porch, soda fountain, shower baths, and locker rooms.

Management helps, but knows that employees get more satisfaction—hence more benefit—from a self-managed program. Funds are obtained from shows, contests, and donations. Every issue of the employee magazine publicizes various phases of the recreation program—from two pages of pictures on the Sweetheart Valentine Dance to as many as six or seven pages given over to the annual musical revue known as the "B. & H. Follies."

BAHEBA's long-range recreational program includes an outdoor swimming pool, driving range for golf practice, complete gun-club facilities, ice skating, additional softball diamonds, more complete lighting of all outdoor facilities.

How company employees and their families relax and play to keep morale high and health secure is shown in the photographs on the two following pages.

FUN FOR ALL . . . President J. H. McNabb, supported by a group of company executives, takes a bow after the final curtain at the Bell & Howell Follies. This may not be art, but it wows employees

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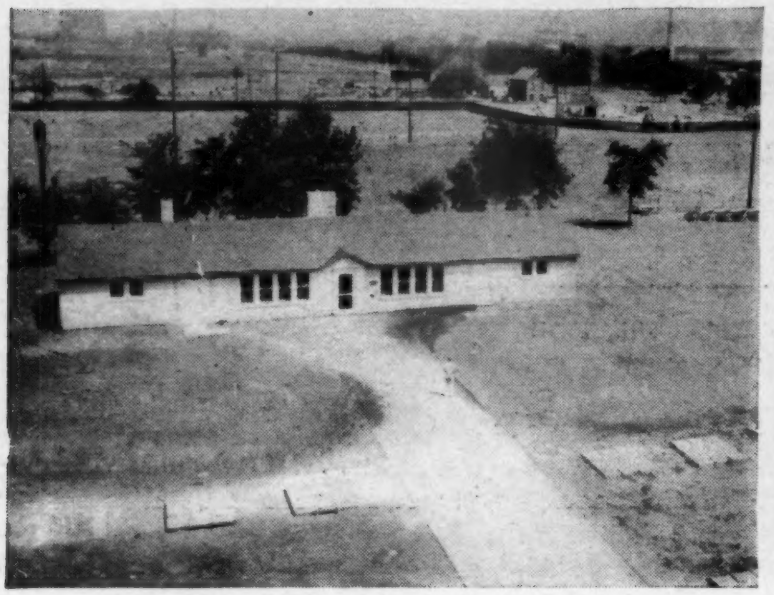


CLUBHOUSE . . . On a 25-acre field adjoining the plant. Soda fountain, music room, game room, lockers, showers. Baseball, softball, volleyball, horseshoes, tennis. Bleachers, lights, a public address system. Fresh country air

PICNIC . . . B. & H. employees—plus their families, friends, and relations—turn out in full force for this annual event

SONG AND DANCE . . . The Filmosound Chorus (left) entertains at one of the numerous company parties. Bell & Howell's younger set (right) likes to dance and get better acquainted, so every year there's a gathering for the "Strike and Spare" dance

RELAXATION . . . Lunch-hour music—or a comfortable chat—for those who want to "unlax." There's ping-pong for the strenuous

HOBBY SHOW . . . Called the Mardi Gras, this annual affair uncovers all sorts of interests and skills. There are plenty of awards, of course, to provide the incentive to exhibit. Workers and their families meet old friends, make new ones

GOLF . . . In the annual tournament executives and hourly workers find they speak a common language

FOLLIES . . . Employees call the signals, and an original, spontaneous show results. Here, a friendly United Nations number

Airplane view of the Western Electric's Kearny Works, comprising 40 buildings from one to eight stories high on a tract of 138 acres, gives some idea of the size of the maintenance job involved. Nearly 1800 men and women service and maintain this large plant

ELABORATE MAINTENANCE SURVEYS KEY TO PLANT FITNESS

HARRY L. HUSSON • SUPERINTENDENT OF WORKS SERVICE, WESTERN ELECTRIC COMPANY, INC., KEARNY, N. J.

A comprehensive plant inspection program is functioning at Western Electric's Kearny Works to insure against any physical interruption in the smooth flow of manufacture of its many products. Fifty types of inspections are involved.

The program operates in principle similar to the purposes and methods of product inspection procedures that are used to obtain the high quality of communications equipment fabricated in this plant.

Very simply stated, the company's product inspection program embodies a system of checks and counter-checks of the communications equipment and its component parts at various stages of manufacture, based on standards derived from the combined experience and engineering skills of the Western Electric Company, its research associate—Bell Telephone Laboratories—and the Bell System operating companies.

In almost exact parallel, the plant inspection program at Kearny provides a system of checks and counter-checks of its service and maintenance program based on the company's experience, on municipal codes, state, federal, ASME, ASA, and National Board of Fire Underwriters' codes, and on the insurance companies' requirements.

Plant inspection is not a new wrinkle in the maintenance program at the Kearny Works. A thorough system of inspection has been in force there since 1924, when the first reel of telephone cable rolled out of the cable shops—first of the Kearny Works buildings to be completed and placed in operation. Today a staff of twelve men and their supervisor, reporting directly to the superintendent of the works service organization, devote full time to periodic inspection surveys of buildings, machinery, and protective and service equipment in the main plant at Kearny and in 19 satellite units scattered throughout the North Jersey and New York metropolitan areas.

Spray booths undergo periodic inspection. An inspector tests the atmosphere in front of one of a battery of booths to check the efficiency of the exhausting unit

Some concept of the magnitude of the maintenance and inspection programs at the Kearny Works may be obtained from a thumbnail sketch of its physical size and layout. The tract on which the main plant is built consists of 138 acres of reclaimed tidewater meadowland adjacent to the Passaic river, midway between Newark and Jersey City.

The main plant includes 23 multi-story buildings, ranging from two to eight floors in height, and 17 single-story structures, which are devoted to manufacture, storage, service, maintenance, and office functions. A 23,000-kw. generating plant and boiler house furnish heat, light, and power. Water and gas are fed into the tract from connecting municipal and commercial lines, and the plant's sewage system joins municipal mains. Installation and maintenance of these lines on company property, however, are functions of the works service organization.

In addition to the buildings, the tract includes 35 acres of parking space, 13 acres of lawns and landscaping, 48,000 square feet of recreational and athletic fields, 272,000 square feet of paved roadways, and 45,000 square feet of walks.

For the transportation of matériel and personnel, the Works operates and maintains two diesel-electric locomotives, two third-rail electric locomotive cranes, and miscellaneous rolling stock over a 5½-mile plant railroad system. It also operates fleets of electric trucks, passenger cars, and trucks for both over-the-road and local service, and 27 freight and passenger elevators.

All plant service facilities, such as power, light, steam, water, gas, and sewage, come under periodic inspections. Here, the relays on the main switchboard in the power house are being checked by three inspectors during the monthly inspection routine

Protection System

The Kearny Works has its own plant protection system, including full-time police and fire departments manned by 127 guards and firemen. It operates its own telephone exchange which serves 2400 local plant lines, and 118 trunk lines connecting with metropolitan exchanges in New Jersey and New York, as well as numerous tie lines to other Western Electric plants and offices throughout the country. Additional service and maintenance functions include plant construc-

TYPES AND FREQUENCIES OF 50 PLANT INSPECTIONS MADE AT KEARNY WORKS, WESTERN ELECTRIC COMPANY

NOT SCHEDULED REGULARLY; PERFORMED AS NEEDED (6)

1. Boiler accidents
2. Elevator accidents
3. Fire or sprinkler leakage reports
4. Good housekeeping
5. Internal inspection of turbines
6. Sprinkler shutoff

DAILY (1)

1. Watchmen's reports

MONTHLY (2)

1. Boiler room and power house
2. Underground flammable material tanks

EVERY ONE AND ONE-HALF MONTHS (7)

1. Elevators
2. Exhaust systems
3. Fire alarm and patrol boxes
4. Fire hydrants and associated equipment
5. Flammable material tanks and containers
6. Locomotives
7. Traveling cranes and portable cranes

QUARTERLY (18)

1. Ambulance cots and emergency stretcher stations
2. Carbon dioxide and steam flooding systems
3. Chains and slings for hoisting
4. Electric trucks and battery charging stations
5. Film storage
6. Fire insurance inspection
7. Gas and oil shutoff valves, ovens, and burners
8. Gas masks
9. Ladders and scaffolds
10. Machine guards
11. Poisonous substances
12. Portable electrical devices and extension cords
13. Safety belts
14. Scales
15. Temporary wiring
16. Test of double-check valves on water supplies
17. Test of sewage effluent and acid neutralizing equipment
18. Variable-pressure sprinkler alarms

EVERY FOUR MONTHS (2)

1. Compressed gas cylinders and associated equipment
2. Portable liquified gas furnaces and torches

SEMI-ANNUALLY (6)

1. Cotton rubber-lined fire hose (2½-in.)
2. High-potential electrical-equipment temperature alarms
3. Leakage test for underground sprinklers
4. Machinery and associated equipment
5. Safety and waste containers
6. Steam containers

ANNUALLY (8)

1. Fire equipment, including carbon tetrachloride extinguishers and fire pails
2. Grounds and bulkheads
3. High-potential electrical equipment at power house
4. House and sprinkler tanks
5. Low-voltage electrical-current distribution systems
6. Pressure test of sprinkler system, including underground piping
7. Pressure test on coffee urns
8. Unlined linen fire hose

Frequent inspections are made of production machinery throughout the plant. Here, an inspector checks the clearances and alignment of the main guides on a punch press

tion; tool construction and service; plant and general material ordering and stores; mechanical and electrical maintenance; receiving, transfer, and warehousing; raw material inspection; janitor and yard service; and scrap material reclamation. Nearly 1800 men and women are employed in carrying out the functions of the works service organization at Kearny and its satellite units.

Practically all the service and maintenance functions and much of the physical plant and its mechanical equipment are covered in one way or another by operating rules, codes, or insurance requirements. These regulations are designed to serve a twofold purpose: (1) The protection of personnel, and (2) the protection of property and equipment. Violations of the regulations constitute potential risks to either personnel or property and equipment, or both.

The principal function of the plant inspection organization, therefore, is to check equipment and operations for conformity to these regulations. However, the over-all inspection program at Kearny goes further. The inspectors also conduct on-the-spot investigations of all fires and accidents, suggesting changes in regulations or operating conditions that will prevent recurrences. They issue permits for certain service and maintenance operations temporarily carried on in restricted areas, such as welding, oxyacetylene burning, sprinkler shutdowns, etc.

The inspectors also periodically check equipment and machinery for wear, improper alignment, and other factors which represent potential hazards to personnel, equipment, or property. Finally, the inspection organization submits periodic reports to upper levels of management, showing the condition of the general plant, based on the results of the inspection routine.

Every Month . . .

AMONG THE ADVERTISING PAGES, these valuable aids to low-cost production: the plant operation man's guide to **WHAT'S NEW IN EQUIPMENT** (page 136) . . . a summary of **LABOR DEVELOPMENTS** (page 210) . . . things **YOU WANT TO KNOW** more about (page 200)

50 Kinds of Surveys

In the performance of these duties the inspection staff conducts 50 different kinds of inspection surveys and issues reports covering its findings at prescribed intervals throughout the year. These surveys are supplemented by the inspectors' day-to-day field observations, watchmen's daily reports, and by the contributions of a cooperative employee body which voluntarily reports various types of operating and mechanical deficiencies.

The 50 inspection surveys are listed, in the order of frequency, in the table on the facing page. Frequency of these surveys is based to a great extent on company experience, although federal, state, and municipal codes, and insurance companies' requirements dictate the frequency of a considerable number of the inspections. Primarily, the inspections are scheduled at intervals which experience has shown to be best suited to efficient maintenance and to the safe margin of operation. Available man-hours for the inspection procedure, which includes the associated written notifications and reports, also have some bearing on frequency, although this factor's influence is minimized by adjusting the sequence of inspections according to importance and relative results.

(EDITOR'S NOTE: *In part II, to follow in the June issue, the author will describe how plant inspections are made, how recorded, and how irregularities are followed up for correction.)*

IT'S MANAGEMENT'S JOB TO FIGHT ECONOMIC QUACKERY

T. ALBERT POTTER • PRESIDENT, ELGIN NATIONAL WATCH COMPANY, ELGIN, ILL.

Nowadays the management men of industry think and talk a good deal about greater *per capita* production as this country's one way to maintain general prosperity.

From the vantage point of operating a manufacturing business, this direct connection between productivity and the general welfare seems perfectly obvious. We of the front office are amazed that the men and women who run our machines—and, quite as frequently, the folks who run their labor unions—fail to comprehend this economic ABC.

Actually, modern industrial development has removed the rank-and-file factory worker so far from the grassroots that anyone in his place could understandably be confused. This complexity has not been his doing, but rather developed with management's successive efforts to produce goods to meet ever-tougher competition. Until management takes on the job of straightening out employees' ideas in this economic area, the workers will probably be good prospects for any special-interest pleader with a plausible set of fallacies to peddle.

When our forefathers established a new form of government in which liberty for the individual was the ultimate objective, American citizens were so close to the sources of their livelihood that it would have been difficult to muddle their economic thinking. The people who then engaged in manufacturing, whether as proprietors or employees, personally performed the series of operations that transmuted a piece of raw material into a finished product.

The problems of industrial management that result from substituting group mechanization for individual manual skills are not only common to practically all industry. They are also at the root of many of the economic and politico-economic difficulties which as a nation we must settle if we are to go onward toward the better life for all which is implicit in the American free economy.

For example, take our own industry

These problems are much harder to compass mentally when viewed in the large than when looked at in the microcosm which is a single industry. For the sake of making my points as clear as possible, let me focus our magnifying glass upon the industry in which I happen to work.

Fortunately for our purpose, this industry affords one of the best examples of how and why this shift has occurred from craftmanship to mass manufacturing. Also, of the worker's accompanying loss of direct contact with the fact that any increase of general prosperity, and in the long run any increase of his own prosperity, depends substantially upon a corresponding increase in production.

At first all watches were made by hand—literally. A hand-made watch was terribly expensive, even though the workman got a living which today would be considered submarginal subsistence. Only the wealthiest nobleman or merchant prince could afford such a timepiece. The ordinary man listened for the quarter-hours tolled by the church bell. The man who was a little more prosperous paid an extra florin rental to live within sight of the clock on the townhall tower. What clocks there were in those days were mounted on spires and towers high above the city as a public service, so that they might be visible to the largest number of people.

Greater Productivity

The only way that so elaborate a mechanical device as a watch could ever be brought within reach of the low-income public—what nowadays is called the mass market—was by transforming its manufacture completely. Literally the original process consisted of hand-building by men of great all-around skill. Instead, a mass production process had to be evolved to take out the manual skill and substitute machine operations requiring at most semi-skilled operators. Actually this was the practical route to greater productivity and thus to raising the general standard of living as respects making watches more widely available.

By 50 years ago, improvements in processes and techniques had increased *per capita* production so greatly that the cost of a watch had dropped to a level within reach of the middle-income group. But people in lower-income brackets usually had watches only if their occupations required. Any American past middle age recalls that in his childhood railroad men were about the only class of workmen who generally owned or wore watches. Most railroaders were exceedingly proud of this distinction, and displayed their watches on the slightest excuse.

By making its manufacture ever more productive, the industry eventually brought down the price of a good watch to within any man's means. This was accomplished by splitting up the jobs, then re-splitting them again and again, and mechanizing wherever ingenuity permitted. As pointed out above, this is essentially the evolution that has come throughout American industry and that has created some of the most urgent domestic problems for which the nation must find the solutions.

In the process of bringing down the price we have simultaneously—and necessarily—taken out of most manufacturing operations the skills that once characterized industry's skilled trades. Only a few factory operations remain in the realm of mechanical artistry. The rest consist of operating a machine, for which an operator can usually be trained within a few months.

So we face personnel problems

Reducing any line of manufacturing from a craft of great skill down to a series of repetitive mechanical operations has boosted production and cut costs. It has brought in its train a sizable set of personnel problems.

The most immediate of these, in today's circumstance of substantially full employment, is that if Jack or Jane gets fed up with the job in the watch factory, there is a job to be had at the creamery or the stove foundry that requires only a few days' training and pays about the same wage rates, even though the incidental benefits that we provide may be missing. The old-time watchmaker—or shoemaker or blacksmith or wood finisher—remained in one industry, usually in one factory, all his life because he could not afford to jettison a skill acquired through years of apprenticeship plus experience as a journeyman. Thereby he became thoroughly aware of the problems and pitfalls that beset the employer, and learned from years of give-and-take that his interests and the boss's are very close together.

Management's problem is how to keep the individual in a mechanized plant job feeling, like the workman in the familiar story of Sir Christopher Wren, that he is building a cathedral, not merely laying brick or stone. Unless the rank-and-file worker senses that his operation is indispensable to production of the finished article, and that the finished article is useful, he cannot feel the personal importance which is essential to the dignity of man. And until he gets some close-up information about how everything about product, company, and even his own job can go haywire if the part he makes or polishes or assembles is faulty or costs too much, how can we expect him to comprehend that he or his rate of production has any personal importance in a factory containing thousands of people?

We came face to face with this problem just a year ago, when we were reconverting from aircraft instruments and military watches back to civilian watches. Our toughest nut was to get the requisite quality in tiny watches for women. Our operators had lost some of their skill through disuse. Our inspectors had to reject too many parts. Production went down. Costs soared. We were in a peck of trouble.

We extricated ourselves temporarily by improvising a campaign that was mostly crusade. Front-office executives walked through the plant discussing quality with operators one by one, asking in

Fifth president of the Elgin National Watch Company, Thomas Albert Potter came to the watchmaking industry after a working lifetime in the cereal business.

Born in Dresden, Germany, in 1883, of American parents, he was brought to this country when he was less than a year old and grew up in Philadelphia. After studying in this country and in Switzerland, he was graduated from Princeton and went to work for the Quaker Oats Company as a salesman. Later he became a millwright in the company, working up through the ranks of supervision and the sales organization. He became vice-president in charge of purchasing in 1929, holding that post until January, 1932, when he was elected president of the watch company.

He served several years as a director of the Illinois Manufacturers Association. Elected vice-president, then president, he is now chairman of the board. He is also a director of the National Association of Manufacturers.

evangelical zeal such questions as: "Suppose that part you are making was going into a watch for your mother, is it good enough?"

Our management pointed out that our reputation would be blackened by letting a defective part get through to the retail customer, that this would eventually spoil the worker's own prospects. We pounded away with group talks and articles in our plant magazine, all for the purpose of getting employees in the frame of mind to put each brick so carefully in place that the edifice can stand solid.

First-hand knowledge for worker

During this quickie campaign we worked out a longer-term program which is now well under way. Called our "Factory Orientation Course," it is an effort to get through to our entire force a personal comprehension of what the business is all about.

To keep the task within size limits that we could hope to handle, and at the same time to give first-hand knowledge to as many workers as possible, we plan to organize 12 committees of 50 members apiece. Thus far we have organized the first three. Each committee meets and during its active life of one month is free to dig as deeply as it cares to into its assigned aspect of the business. As its group speaker, and available for consultation or counsel at the committee's initiative, the company supplies an executive who is our foremost expert in his line.

Unions Send Delegates

Membership of the committee comes from several sources. The American Watch Workers' Union (Independent), representing our production workers, and the International Association of Machinists, representing our workers who make tools and machines, select delegations to the orientation committee in proportion to their total membership. Some representatives come from our Aurora, Ill., plant 25 miles away.

Each committee organizes itself, chooses a chairman and a subcommittee to draw up a report. This report is published as a pamphlet and goes to all employees. As this is written, in late March, the first two reports have been published and circulated to the entire force.

The first committee met in January, with me as speaker. I gave them my idea of the company's major problems and how they may be solved, then opened the meeting for discussion and questions however intimate. I even offered to tell them my salary and explain why I think I am worth it, if anybody cared. Nobody asked that particular question, but they bored into a lot of subjects that apparently were worrying some of our people. I gave them completely frank answers, authorized them to get fuller information from such sources as the comptroller and the general superintendent on subjects about which I did not know all the answers.

They dug into several topics during the weeks following our meeting. When their report was published, it showed a comprehension of company problems far beyond what they seemed to have when we first met. And the wide, thorough reading given their pamphlet by other workers indicates that the committee explored byways that were interesting to many of our people.

Our March committee drew as its speaker the head of research, primarily because its session coincided with our announcement of a high-alloy, corrosion-resistant mainspring which had been under research for 12 years. The members are currently absorbing all they can learn of what the laboratory men do, why they do it, and how it pays the company. We are looking forward with interest to that report, because research ties more directly into factory operating than either of the previous committees' subjects.

Speakers already scheduled for future committees include the secretary-treasurer, who will analyze the company's annual report; the comptroller; the advertising manager; the head of our law department; the chief designing engineer; the chief production engineer; the purchasing agent.

As yet we—and practically all industry in the U. S.—have a long row to hoe before our workers regain the common-sense perspective on economics that was the birthright of American workers when the nation was young, when employers operated small units, and when individual skill was the foundation stone of manufacturing. But there are encouraging signs. More and more companies are doing a constructive job of placing economic information before their workers, whether in classes, committees, or otherwise. If the trend continues—and it must—then the next generation of industrial managers will be dealing with a labor rank and file that can smell a red herring before an over-aggressive union leader drags it across the path of smooth industrial relations.

The Worker's Heritage

Free economy is based upon liberty for the individual, which our forefathers considered the first requirement of the form of government they were establishing. It is still the first requirement. It has led straight to a high standard of living and to the world's greatest industrial development.

This free economy of ours bears a dozen different names. By whichever name we call it—free enterprise, private enterprise, capitalism, the incentive system, the profit system—we mean the form of economic organization that for many decades has enabled the American people to provide for themselves the world's greatest measure of personal freedom and the world's highest standard of living. This is the heritage of all Americans, and workers have fully as much to gain by its continuance as have industrialists.

To keep his rights to a free economy, the citizen must know enough to shun economic quackery however plausibly presented. Given a maximum freedom from needless restraints, the informed individual can exercise his maximum initiative as an economic unit, in full confidence that the more he produces, the greater is his compensation.

CARTOON STRIPS PROMOTE THE SUGGESTION SYSTEM

Newest technique for encouragement of suggestions may be AC Spark Plug's use of cartoon strips in the employee magazine. The cartoons below were accompanied by a short article pointing out that Tom Chittle was the sixth member of the organization to receive the maximum award since the inception of the General Motors suggestion plan 5 years ago

How TOMMY CHITTLE WON A $1,000 AWARD!

HE OBSERVED THAT INSULATORS WERE LOADED IN 100 HOLE BOARDS AFTER LEAVING GLASS SEAL FURNACE

AFTER AIR TESTING, THEY WERE TRANSFERRED FROM BOARDS INTO BOXES

THEN THEY WERE TRUCKED TO DIPPING STATION WHERE THEY WERE TRANSFERRED INTO METAL BASKETS

INSULATORS WERE THEN OIL DIPPED AND DRAINED

AFTER DRAINING THEY WERE TRANSFERRED BACK INTO BOXES AND TRUCKED TO BLACK LIGHT STATION

THEY WERE EMPTIED ONTO BLACK LIGHT BENCH, CHECKED 100 % AND LOADED INTO 330 HOLE METAL TRAY

THIS IS WHAT WAS DONE TO IMPROVE ABOVE CONDITION

INSULATORS ARE LOADED INTO 330 HOLES TRAYS AS THEY LEAVE FURNACE

LESS STOCK HANDLING

PRODUCTION SUPERVISION OF PLANT 8 PROVIDED A LARGER DIPPING TANK SO THAT INSULATORS CAN NOW BE DIPPED IN THESE TRAYS, AVOIDING PREVIOUS ROUGH HANDLING

LESS BREAKAGE DUE TO ROUGH HANDLING

THEY ARE THEN BLACK LIGHT CHECKED 10 % IN THE SAME TRAYS

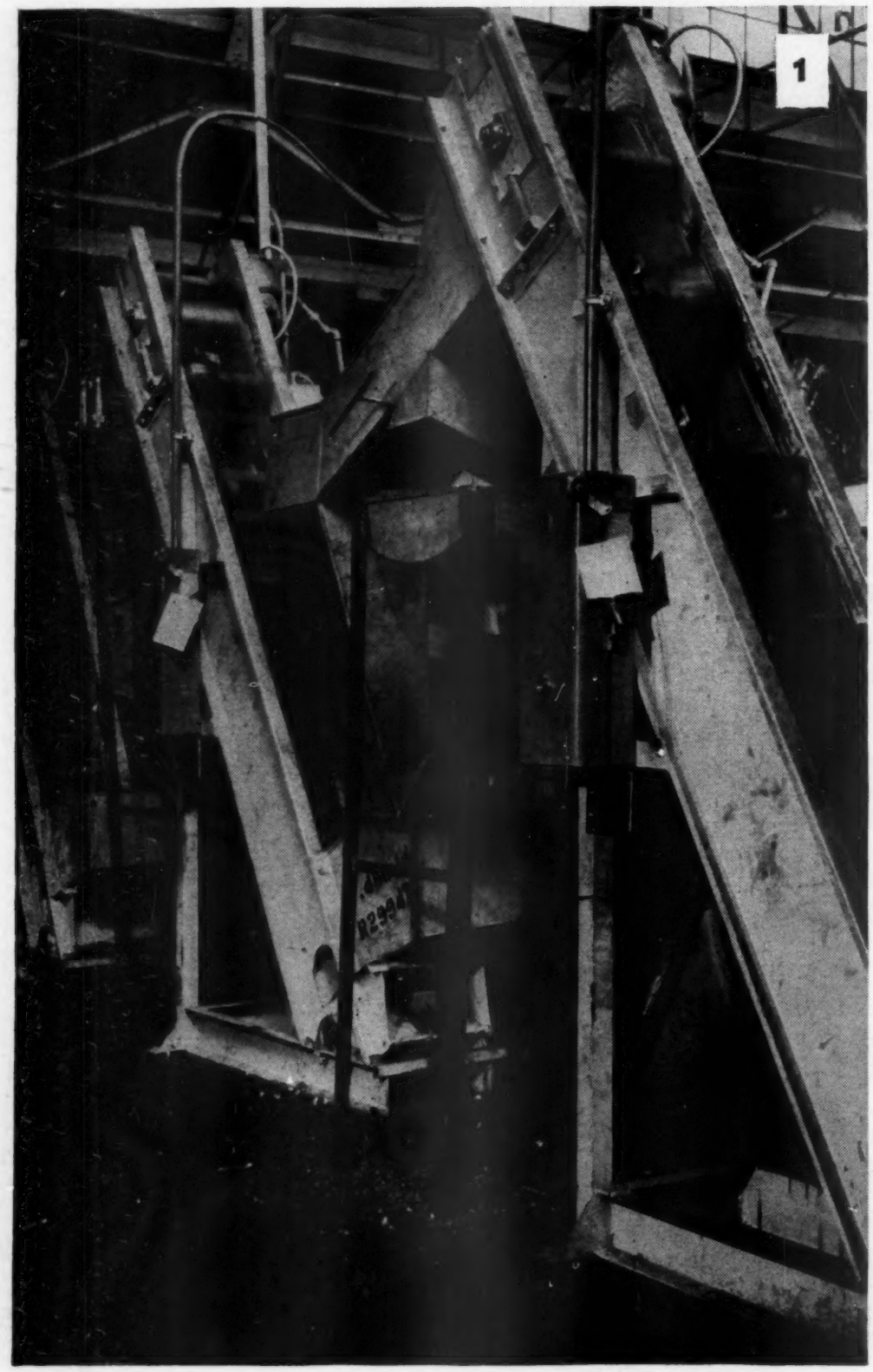
BLACK LIGHT CHECK REDUCED FROM 100 % SORTING TO 10 % INSPECTION

YOU CAN SUGGEST BETTER METHODS TOO!

FLIGHTS AND CHUTES FOR BETWEEN-OPERATIONS HANDLING

Chutes, flight conveyors, monorails, and belt conveyors have made the transfer of materials between operations practically automatic at Fisher Body-Ternstedt Division, Trenton, N. J.

Most of the parts made at the plant require from one to a dozen successive press and machine operations before proceeding to final plate, paint, or assembly. To accomplish this, machines have been "ganged" in numerous short production lines throughout the 25-acre plant. At the end of most of these lines, monorail conveyors pick up the finished pieces and carry them to the final operations. Where parts are too small or are too irregular to be carried directly, totepans travel on the monorails—9 miles of monorails. Virtually nothing stands still in this plant.

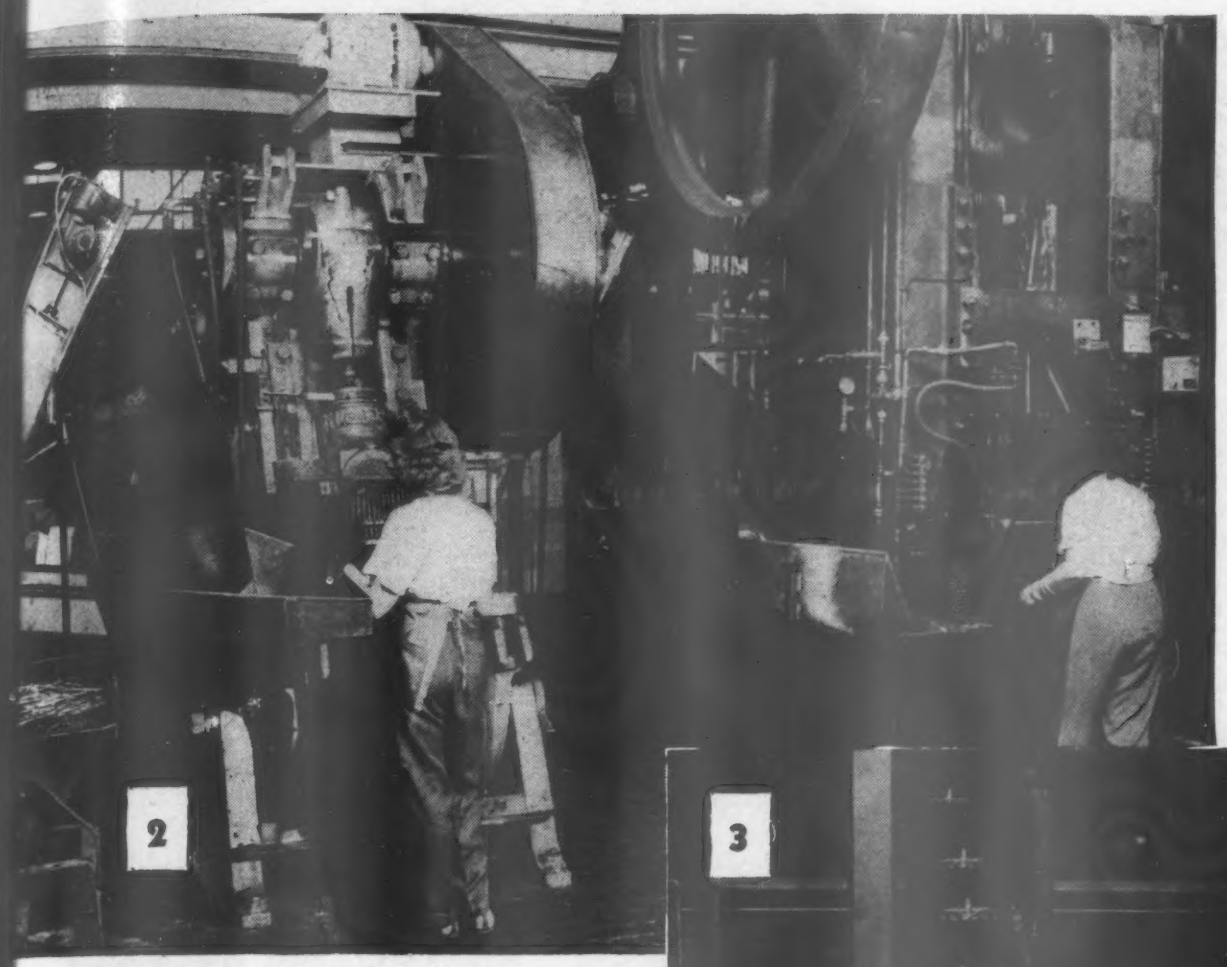


1. When, for example, several successive blanking and forming operations are to be performed on a given piece, presses are so arranged that as soon as the dies separate, an air jet blows the piece out of the back of the press. At this point it falls onto a moving flight conveyor which carries it upward and deposits it in a chute. Such an arrangement of flights and chutes is shown in the photograph. Note the handle on the chute. By changing the position of the handle, a gate in the chute may be opened or closed, thereby sending material to the adjacent machine, or diverting it to the next flight conveyor. This possibility of bypassing any given machine or machines provides maximum flexibility to the line, and greatly simplifies the problem of retooling.

2. Here is a view of the working side of a similar group of machines, showing how the chutes deliver the material, in many cases pre-positioned, to a spot where it can be reached quickly and conveniently for insertion into the press for the next operation.

Safety is stressed throughout the plant. The rubberized gloves prevent metal parts from slipping and possibly cutting the hands. Machines are fully guarded, and both hands must be used to operate an interlocking release.

3. In the die cast department, miscellaneous pieces of automobile hardware co.ne from the mold in groups of from six to a dozen at a time. The operator is seen removing castings of 12 door handles. A short, slow-moving conveyor with a belt of heat-resisting steel mesh



carries the hot castings to the rear, deposits them on the transverse—and more swiftly moving—standard belt conveyor.

4. Castings are carried directly to machines where the flashings and excess metal from the mold are punched off. These machines throw the scrap back onto the returning belt, which takes it to remelt. The handles themselves enter chutes which carry them to the operations shown in the photograph.

Just out of sight in the rear of this group of machines, the first operation is performed on the handles. The belt conveyor then brings the handles to the girls in the back who are performing a reaming operation. The dividing device on the conveyor makes it unnecessary for the operators to reach for work; it is delivered right to the workplace. This process is repeated as the handles move to the operators in the foreground. And just to this side of each of these presses is a monorail carrying tote boxes. The parts are stored and sent on their way to the plating room with a single arm movement on the part of the operators.

Maintenance department record when photograph was taken, is testimony to the success of the safety program. This no-accident record was continued during February and March

Below—maintenance workers get a shot of accident prevention that "takes"—with a poster that talks their language

National Safety Council

INSTILLING SAFETY HABITS IN MAINTENANCE WORKERS

H. M. BRADLEY • PLANT ENGINEER, MANNING, MAXWELL & MOORE, INC., BRIDGEPORT, CONN.

Maintenance workers *will* take chances. It is therefore the maintenance supervisor's special responsibility to recognize the hazards that workers in his department face—and to protect them, often against themselves.

That, at any rate, is the way management at Manning, Maxwell & Moore sees the problem. And the answer is a comprehensive safety program for maintenance men that brings real results—for example, not a single accident, lost-time or otherwise, in the months of January, February, and March.

The plant engineer directs the program. Its underlying aim is to bear down as hard as possible on preventing occurrence, recurrence, and severity of accidents.

An accident prevention committee—three employees representing the union; three foremen, management—assists the plant engineer.

A working supervisor heads each division of mechanics—electricians, oilers, beltmen, and so on. Supervisors meet weekly with the plant engineer to go over safety reports.

Supervisors extend the program's reach into the plant by appointing a top mechanic for a quarterly tour as inspector for his group. The inspector's name is always posted so that other employees will know who their safety representative is. These on-the-job inspectors develop some of the plant's best safety techniques.

The above organization has brought many practical ideas to light and has developed safety rou-

tines to match specific needs. Highlights of MM&M's comprehensive program follow:

SELLING SAFETY . . . Any program, to stay fresh, has to hit the worker where he lives. Posters help when they talk the maintenance man's language. We capitalize on a common trait found among maintenance workers—a sense of humor. Put up a monkey-business poster that shows a worker pulling a boner and getting hurt in the process. The maintenance employee will invariably say, "I remember a guy who did that same thing." Such posters give maintenance men a shot of accident prevention that "takes." Statistics alone do not.

WOODWORKING MACHINERY . . . We have found that one of the best ways to prevent accidents is to keep machinery in good condition and keep it *sharp*. Only a top-flight mechanic, whose duties keep him in close touch with machine work, is allowed to change and sharpen planers, saws, and other equipment. They are his "babies," and the other mechanics are just as well pleased to have it that way.

Proof that the system works is shown by the record—in over 15 years there hasn't been one accident in the woodworking shop, despite the fact that four boxmakers, fifteen carpenters and cabinet makers, and six pattern makers all work in that department, and use the same equipment.

HIGH-PRESSURE INSTALLATIONS . . . Extreme care is the rule for safety education and selection of personnel who work with high-pressure installations. It is a matter of everlastingly impressing on mechanics that the very lives and safety of maintenance and production workers depend on the mechanic's knowledge of how to make up various testing units correctly.

ELEVATORS . . . Here, if any place, maintenance and safety go together. Night electricians inspect elevators when they are not on call for production purposes. In addition, a nationally known elevator service company is employed to inspect elevators once a month and make sure everything is in A-1 shape. The record—not one accident or shutdown—shows it pays to keep elevators in good condition all the time, with all safety appliances working.

HOISTS . . . Electric hoists are checked by electricians. Millwrights examine all mechanical hoists. Monthly reports must be turned in. Replacement request is made and filled promptly from a standard inventory card listing all important items, such as links, I-beam supports, stops, etc.

CLEANING PARTS AND MOTORS . . . At the suggestion of a safety inspector, a discarded hot water tank was cut in half. A drain pipe and valve were installed at the base of one of the tank sections for tapping off the solution when dirty. A small hoist lifts objects in and out of the improvised tank, which is filled with a non-flammable solvent. The solvent is agitated by an air hose. A mechanic equipped with proper gloves and goggles is able to do a quick and thorough job of cleaning parts and motors—and do it with complete safety.

LADDERS . . . The safety inspector for the maintenance department keeps a sharp check on ladders—safety feet, rungs, and so on. Ladders not in good condition are condemned. Each mechanical group has its own ladders, which are painted a distinctive color for iden-

Here, a motor oiler wearing proper gloves and goggles does a safe, quick job of cleaning a motor. Idea for the method used was developed by a safety inspector

tification. Where maintenance men have regularly to service overhead equipment, a permanent ladder with safety treads and side rails is installed.

GOOD HOUSEKEEPING . . . It is doubtful if any group of workers can do more to prevent accidents than porters. Clean stairways, hallways, alleyways, and departments go a long way toward keeping accident rates low. It is too much to expect electricians, carpenters, and pipefitters, as they work, to keep all material they use in perfect order, yet it is the left-over piece of conduit or board with a nail in it that is a potential hazard. That's when the porter becomes a part of the maintenance safety program on definite assignment. He steps in at the final phase of every job, or at the close of the day's work, to finish the cleaning.

JINX WORKERS . . . Occasionally the accident-prone employee will show up. Putting him with careful workers is only taking the risk of involving them in accidents. The accident-prone worker, when approached diplomatically and asked what he would do in a like case were he a foreman, will usually say, "Put him on a safer job."

MORALE . . . With highly skilled mechanics, morale will be high if pride in good workmanship is respected and encouraged. Supervisors and top-flight mechanics can set the pace for safety by the workmanlike way they dress, their observation of good housekeeping, and the elbowroom they give to unnecessary risks.

An open-door policy for maintenance mechanics at the safety director's office and the absence of red tape build morale. One object is to make it easy for the employee to draw safety equipment *before* an accident can happen. Purchasing standards for equipment have been well established over the years, but no employee is obliged to use a brand or type of equipment he does not believe in. The main idea is to have him use safety equipment. Eventually he'll ask for what has proved best over the years.

RECORDS . . . Each group of mechanics has its own accident record board. These boards show how many days have been worked without a mishap, and give a report of all accidents, no matter how trivial.

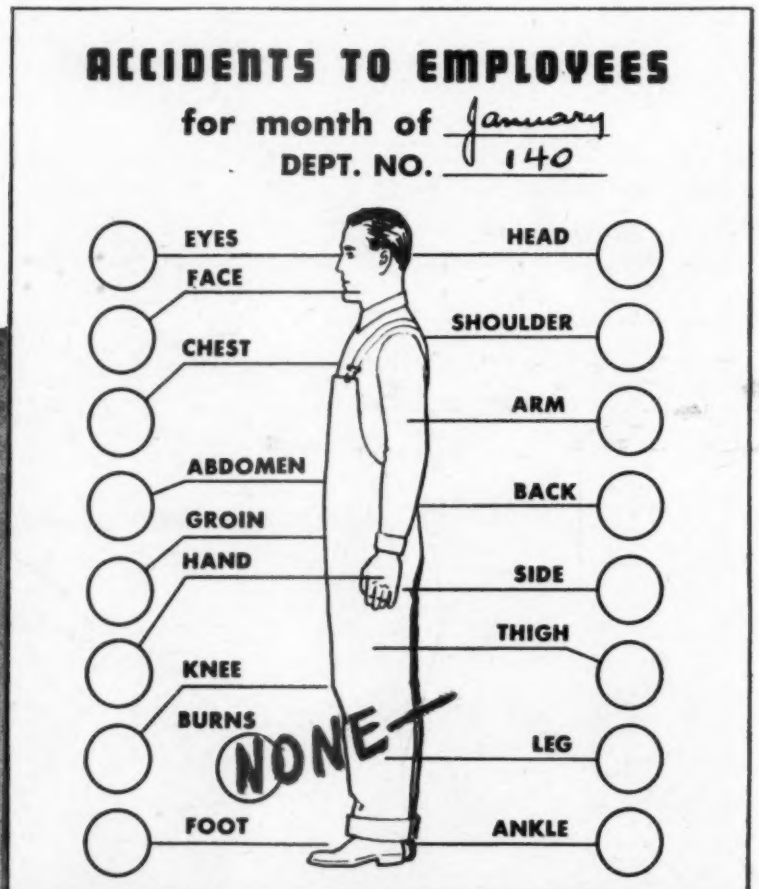
To acquaint employees with the type of accident happening most frequently, a figure of a man is shown on a chart. Around this figure are small circles marked to indicate the type of accident—head, arm, groin, back, and so forth.

The safety director keeps records of the frequency, severity, and place of accidents. Inspection reports are collected. Safety equipment is inventoried, and expenditures are accounted for.

HEADING OFF SEVERITY . . . All minor cuts and abrasions must be attended to immediately at the plant hospital. That is one strict plant rule. This may raise the frequency rate, but it greatly reduces accident severity.

Mechanics who have any illness or injury that constitutes a degree of risk in working, are required to go home and rest in bed. Light jobs are not assigned just to keep a man on the job and save a safety record.

When an accident does happen, its cause and correction become the safety department's special problem. It may mean providing additional mechanical guards, education to effect more intelligent operation, or a drive to turn up a safer policy. Whatever the problem, it must be determined and corrected promptly.



Each department has its safety bulletin board. The chart below lists the number of accidents by month. Above, the type of accident that is happening most frequently

Dept. 140	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
TOTAL ACCIDENTS last year	1	2	1	1	1	1	2	0	0	0	0	0
TOTAL ACCIDENTS this year	0	0	0									

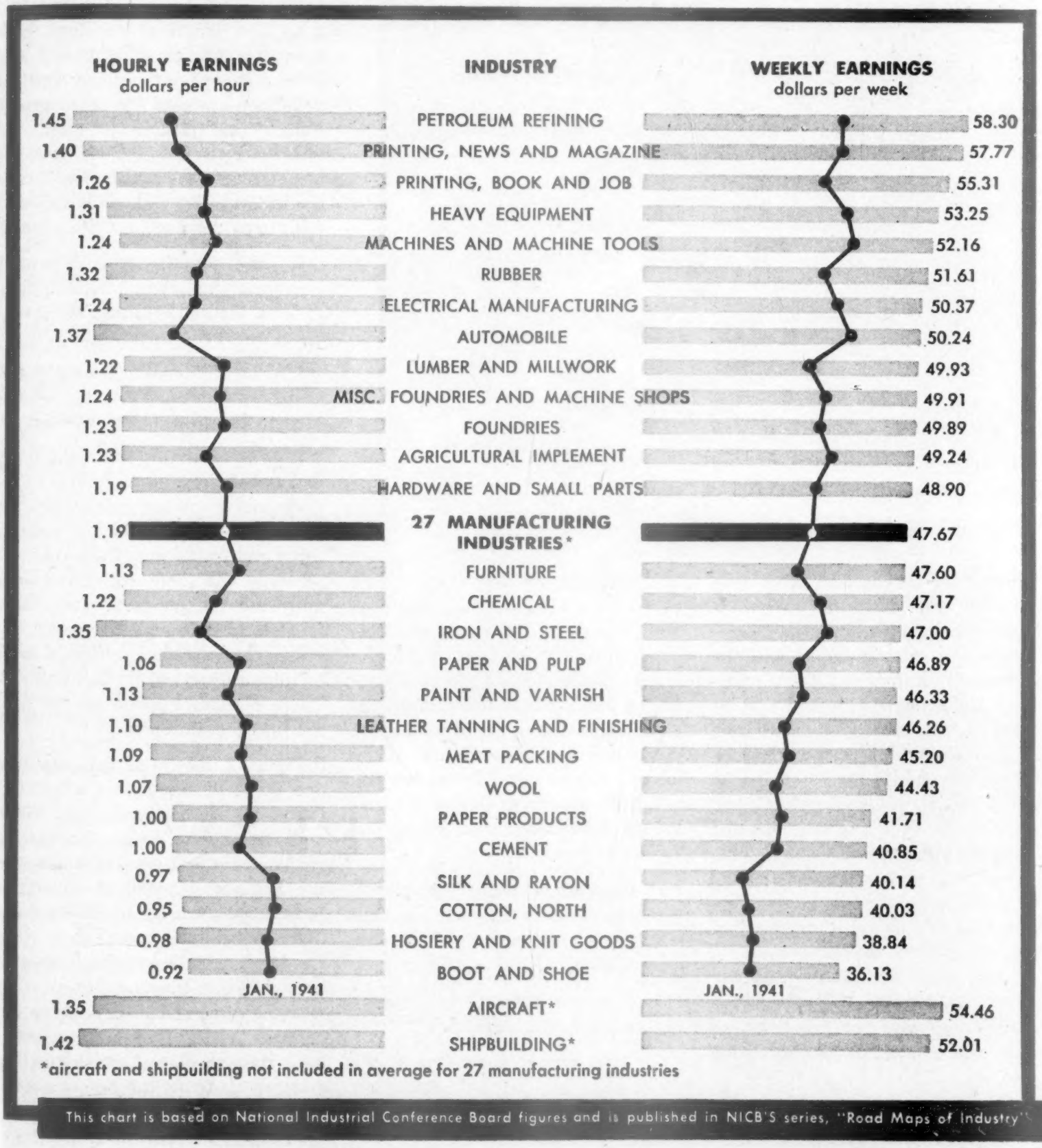
TOTAL NUMBER OF ACCIDENTS (THIS YEAR)_____

HOURLY AND WEEKLY EARNINGS

29 Manufacturing Industries, Average, 1946

Weekly earnings of production workers in 27 manufacturing industries surveyed by the National Industrial Conference Board averaged $47.67 in 1946. They have risen 55.5 per cent since January, 1941, the base date of the Little steel formula. This change results from a 56.6 per cent increase in hourly earnings and shortening the work week from 40.2 to 40.1 hours.

Hourly earnings in the 27 manufacturing industries averaged $0.76 in January, 1941. They averaged $1.19 in 1946. Increases in individual industries ranged downward from 84.5 per cent in the northern cotton industry and 83.0 per cent in the silk and rayon industry. Other large increases were 72.2 per cent in the hosiery and knit goods industry, 68.6 per cent in the wool industry, and 68.4 per cent in the boot and shoe industry.

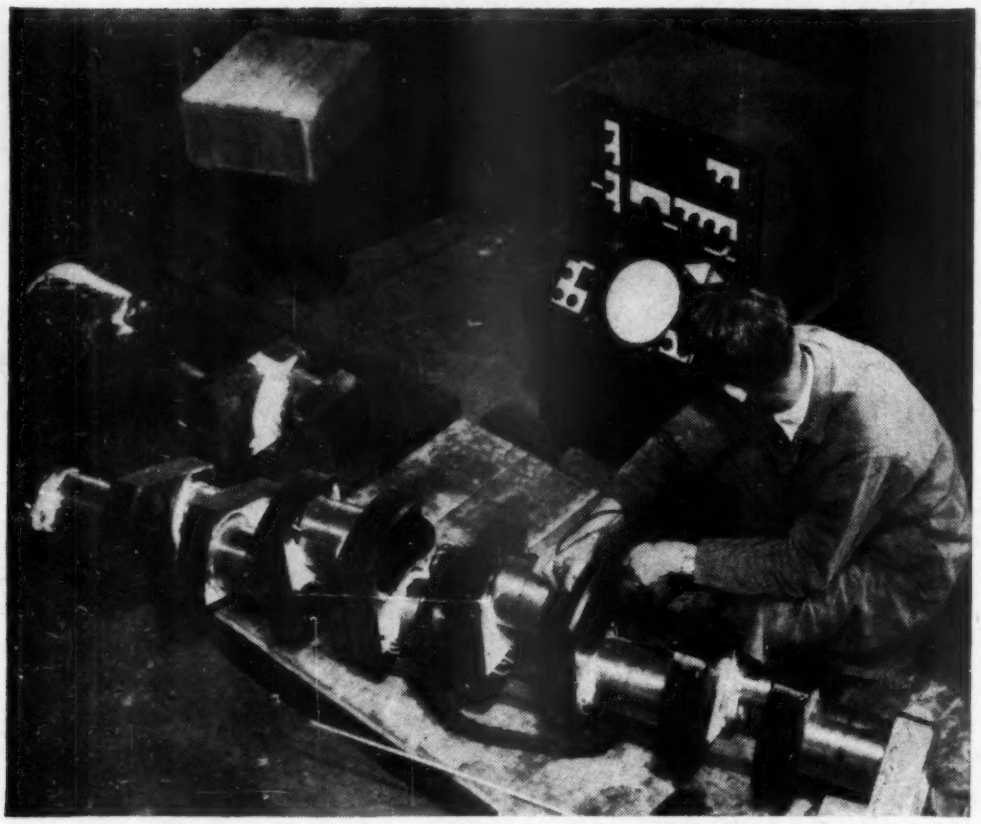

HOURLY EARNINGS
dollars per hour
INDUSTRY
WEEKLY EARNINGS
dollars per week
1.45 PETROLEUM REFINING 58.30
1.40 PRINTING, NEWS AND MAGAZINE 57.77
1.26 PRINTING, BOOK AND JOB 55.31
1.31 HEAVY EQUIPMENT 53.25
1.24 MACHINES AND MACHINE TOOLS 52.16
1.32 RUBBER 51.61
1.24 ELECTRICAL MANUFACTURING 50.37
1.37 AUTOMOBILE 50.24
1.22 LUMBER AND MILLWORK 49.93
1.24 MISC. FOUNDRIES AND MACHINE SHOPS 49.91
1.23 FOUNDRIES 49.89
1.23 AGRICULTURAL IMPLEMENT 49.24
1.19 HARDWARE AND SMALL PARTS 48.90
1.19 27 MANUFACTURING INDUSTRIES* 47.67
1.13 FURNITURE 47.60
1.22 CHEMICAL 47.17
1.35 IRON AND STEEL 47.00
1.06 PAPER AND PULP 46.89
1.13 PAINT AND VARNISH 46.33
1.10 LEATHER TANNING AND FINISHING 46.26
1.09 MEAT PACKING 45.20
1.07 WOOL 44.43
1.00 PAPER PRODUCTS 41.71
1.00 CEMENT 40.85
0.97 SILK AND RAYON 40.14
0.95 COTTON, NORTH 40.03
0.98 HOSIERY AND KNIT GOODS 38.84
0.92 BOOT AND SHOE 36.13
JAN., 1941
JAN., 1941
1.35 AIRCRAFT* 54.46
1.42 SHIPBUILDING* 52.01

*aircraft and shipbuilding not included in average for 27 manufacturing industries

This chart is based on National Industrial Conference Board figures and is published in NICB'S series, "Road Maps of Industry"

SUPERSONIC EQUIPMENT AVAILABLE FOR FINDING FLAWS

G. A. VAN BRUNT • ASSOCIATE EDITOR, *FACTORY*



HERE A CRACKED ENGINE CRANKSHAFT IS BEING TESTED FOR OTHER DEFECTS

Testing of metals and other materials for flaws by means of high-frequency—supersonic—vibrations is now possible with an instrument known as the Supersonic Reflectoscope, introduced by Sperry Products, Inc., Hoboken, N. J. Non-destructive testing by this method has been applied to parts made of steel, aluminum, magnesium, brass, glass, plastics, and other metals and materials.

One important advantage claimed for supersonic testing is that defects may be located in forgings and castings up to 10 feet in depth.

Application of high-frequency vibrations in testing for flaws depends on several characteristics of such vibrations, particularly the following:

1. They tend to travel in a straight line, about like light waves.

2. Supersonic vibrations are best transmitted through solids or liquids and are reflected from discontinuities in solids in much the same manner as light waves are reflected from a light-reflecting surface. When testing a material, these vibrations are beamed into it by using a quartz crystal that has the ability to transform electrical oscillations into supersonic vibrations and *vice versa*.

In Figure 1 is shown a schematic representation of the various components of the supersonic testing instrument. Their functions are:

1. The synchronizer is the timing unit for the instrument.

2. The sweep generator energizes the horizontal deflection plates of the cathode ray tube to control the sweep.

3. The pulse generator transmits high-frequency electrical pulses, 60 times a second, to the amplifier and searching unit.

4. The amplifier receives both outgoing and incoming pulses and in turn energizes the upper vertical deflection plate of the cathode ray tube. This plate acts upon the electron beam causing it to trace out on the screen vertical indications of the initial pulse and of all reflected vibrations received by the crystal.

5. The square wave generator energizes the lower vertical plate to form the markers that show distance between indications.

6. The high-voltage supply energizes the electron "gun" of the tube to form the electron beam.

7. The searching unit containing the quartz crystal receives high-frequency electrical pulses from the pulse generator through a coaxial cable and transforms them into supersonic vibrations which it transmits into the material under test. It also transforms into electrical pulses the vibrations reflected back by discontinuities in the material. These electrical pulses are in turn fed into the amplifier.

Figure 2 illustrates the path that one pulse of supersonic vibrations takes, and the surfaces from which it is reflected. From the testing surface a quartz crystal starts into the material a pulse of vibrations lasting only 4 to 10 micro-seconds. These vibrations travel in a relatively straight line in the form of a beam. When they reach the other side they are reflected back to the crystal. Also, they are reflected back by any discontinuities in the material, such as the defect shown in the diagram.

In Figure 3 is shown a photograph

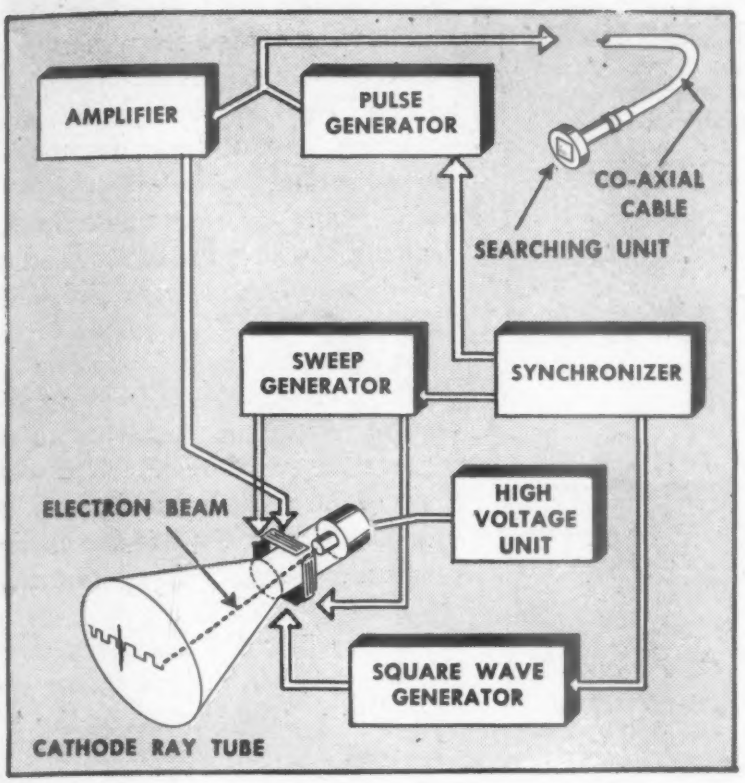


Figure 1. This diagram shows the parts comprising a supersonic vibration tester. Their functions are explained in the text

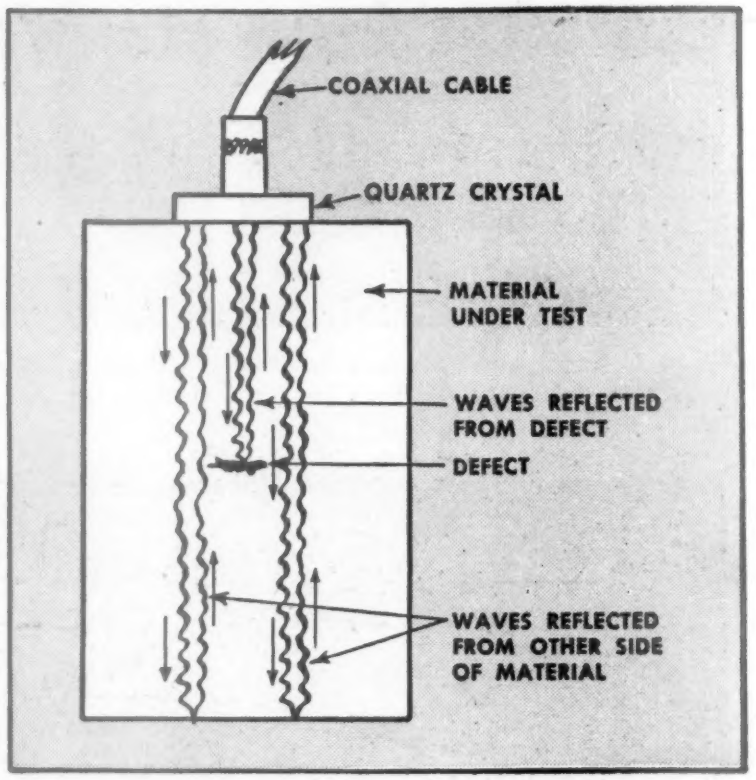


Figure 2. Supersonic vibrations are reflected from opposite side of part under test, and from cracks or other defects

of the Reflectoscope screen that gives the test indications from a defect similar to that in Figure 2. The initial pulse at the left represents the surface of the part. The indication at the right is the reflection from the other side, and the smaller indication in the center is from the defect. Through the center can be seen the square wave form of the horizontal sweep representing distance in the material.

This record of a defect can be made at any time with a simple camera and cone assembly.

Frequency of the vibrations obtainable from the instrument ranges from 0.5 to 11 megacycles. In practice the usual frequency of the vibrations employed is 0.5, 1, 2¼, or 5 megacycles.

For most applications the testing technique is relatively simple. The ends of a shaft, say, are cleaned, removing paint, scale, or rust. If there are any very rough spots, they are smoothed off with emery paper. A portable disk sander provides an easy and quick way of obtaining a satisfactory surface. Any dust is brushed off and a film of oil or glycerine is put on the surface.

The searching unit is then applied to the end of the shaft and moved back and forth across the surface, while the operator watches the screen of the instrument for any reflections from cracks or other internal discontinuities.

Because these high-frequency vibrations are in the form of a beam, it is possible to trace the area of a crack as well as locate its distance from the testing surface. Figure 4

Figure 3. Sides of part are indicated at left and right. Defect shows near center

shows the photograph of a locomotive crankpin that was cut apart to verify the results of such a test. Accurate location of the cracks was verified and the area covered by the crack was substantially correct, as sketched at the time of test.

Supersonic testing is now applied to axles and crankpins on four leading railroads in the United States. The importance and advantage of being able to locate cracks without the necessity for disassembly is obvious. Previously it had always been necessary to press off the wheels before the axle or crankpin could be tested for cracks, an operation that usually spoiled the wheel fit.

It has been found desirable as an economic, as well as a safety, measure to test all forged axles used on giant earth-moving machines.

One typical test involved a large press cylinder that had cracked through the top, and was tested supersonically to determine the extent of the cracked area preparatory to cutting it out and welding. The top of the cylinder, after the surface

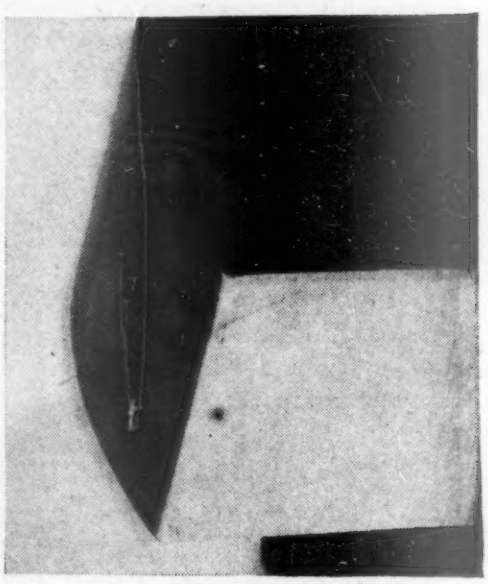


Figure 4. The small crack shown was indicated by test, verified by cutting part up

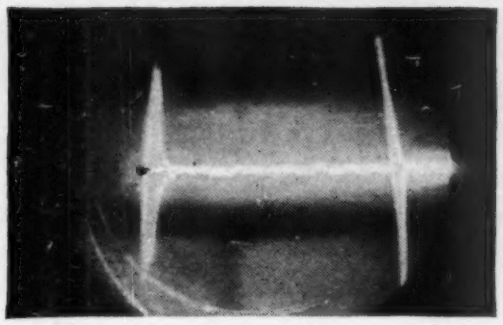


Figure 5. Good section of press cylinder gave this reflectogram, showing clean line

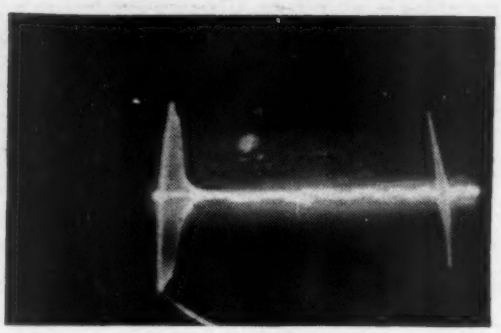


Figure 6. In the poor section of cylinder the reflectogram shows shrinkage, voids

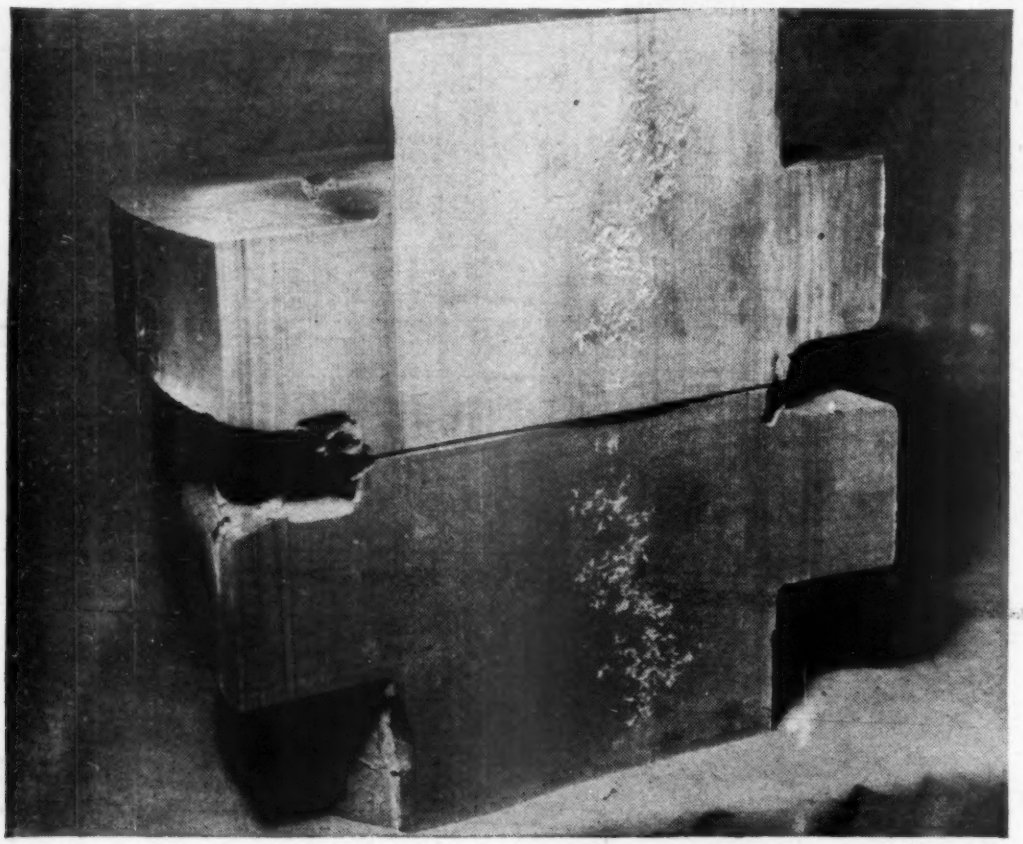


Figure 7. The shrinkage areas to be seen in this section of a cast-iron crankshaft were first revealed by the test indications that are shown in Figure 8

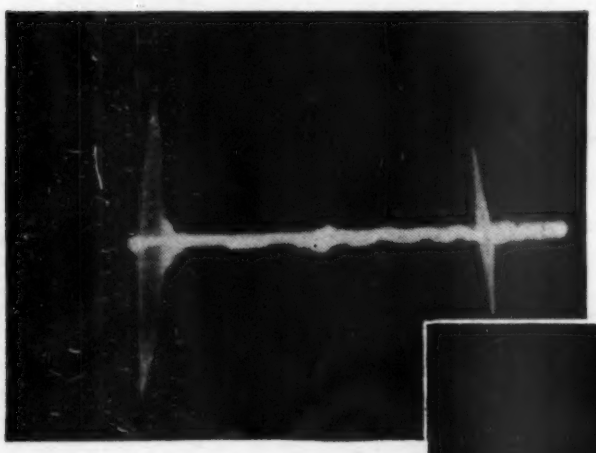


Figure 8. Shrinkage in the crankshaft in Figure 7 was shown by these test indications

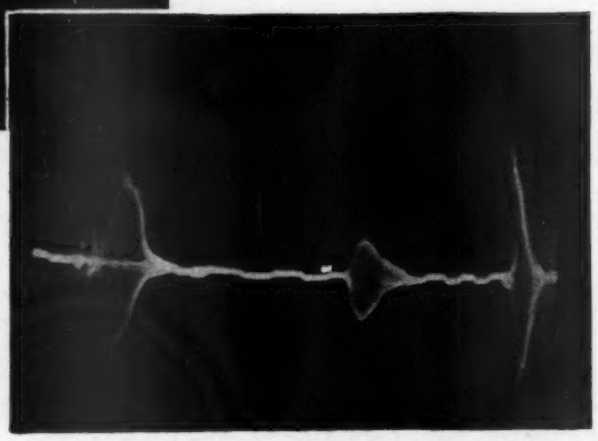


Figure 9. Under supersonic testing, flaking gives the characteristic indication shown

had been smoothed off, was marked off in sections in checkerboard fashion, and each section was identified by letter. A full-scale drawing of the top similarly was laid off in sections. Notations were made on this drawing showing the exact location and depth of the cracks and other discontinuities. As a result of the test a considerable area was marked off that contained small voids and a porous condition referred to as "centerline weakness." The diagram of the defective area then provided an accurate guide for cutting out and welding up all the defective area.

Figures 5 and 6 show the comparison between the indications obtained in a good section of the top part and a poor section. It will be noted that the line in Figure 5 is clean, with a large reflection from the other side 14 inches away, as compared to the indication in Figure 6 where partial absorption has taken place, a small shrink being indicated at a point that is about 5½ inches from one side.

Defects in Crankshafts

Diesel engine crankshafts, particularly the larger sizes, can be tested for shrinkage areas and cracks. Figure 7 shows a shrinkage area located in a cast-iron crankshaft, while Figure 8 shows the indication given by the instrument, through the same area. Note the indications near the center, and the absence of back reflection.

Another important application of supersonic testing involves forged and cast rolls for rolling mills. In one instance a big back-up roll was tested, and indications of a large "hang" were noted at a point 12 inches from one edge. When a steel ball was dropped on it the roll broke within ½ inch of the mark and revealed the large "hang" that had been indicated.

Flaking, or hydrogen bursts, is a dangerous internal defect occasionally found in rolled and forged steel parts. It occurs during a cooling cycle and has not been easy to locate except by destructive testing. Supersonic testing easily locates flaking, which can be identified by the characteristic pattern of reflections seen in Figure 9.

USA 1950-1960

e Twentieth Century Fund, a privately-endowed
search foundation, has just completed a monu-
ental 875-page work called "America's Needs and
sources." In it is presented a detailed preview of
at economic life in the U. S. A. during the 1950-60
cade will be like if we succeed in maintaining high-
vel employment. From the findings of the Twentieth
ntury Fund survey, the McGraw-Hill Department
Economics has prepared this synopsis, which high-
hts points of interest to readers of this magazine.

MORE PEOPLE WORKING . . .

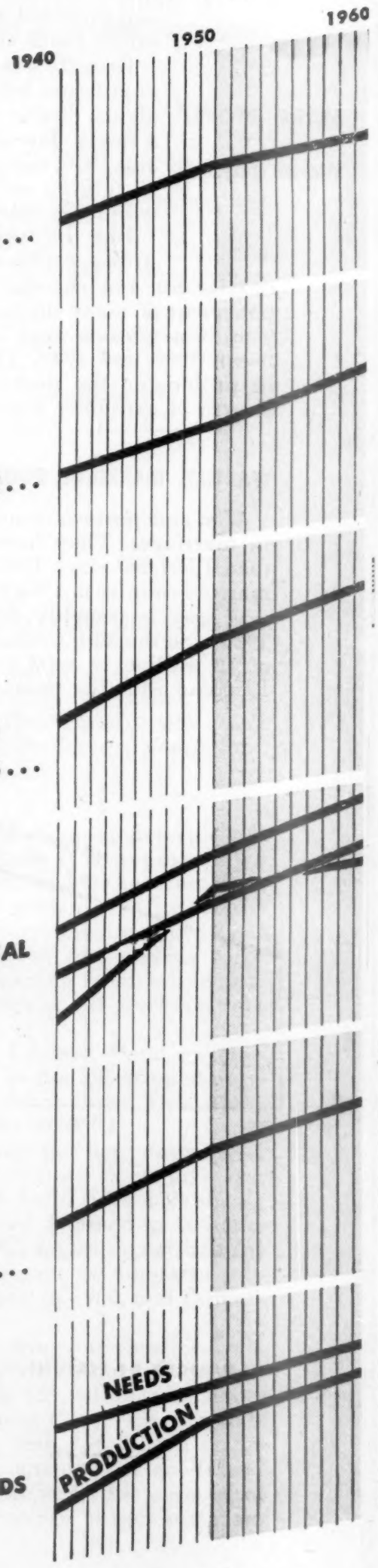
EACH PRODUCING MORE . . .

CAN TURN OUT ENOUGH GOODS AND SERVICES . . .

FOR CONSUMERS, CAPITAL INVESTMENT AND GOVERNMENT

WITH THE RESOURCES AVAILABLE . . .

TO MEET ALMOST ALL OUR NEEDS



POPULATION

A nation's wealth depends more than anything else on the size and vigor of its population. Much of the increase in U. S. production during the past hundred years is a result of a rapid growth in population. This growth supplied manpower for farms and factories and provided an expanding market for consumer goods and services.

MORE PEOPLE WORKING . . .

Growth was the outstanding fact about population before 1930. The birth rate was almost double the death rate and there was a heavy flow of immigrants. Between 1900 and 1930, the population increase averaged 15 million each decade. Immigration contributed a third of the increase.

But this trend was checked by the depression 30's which stemmed the flood of immigrants and cut the birth rate by forcing postponement of many marriages. As a result, fewer than 9 million persons were added to the population between 1930 and 1940. This was an important factor in prolonging the depression because it slowed the growth of consumer markets.

WARTIME MARRIAGE BOOM

War and postwar conditions have brought a boom in marriages. They have exceeded normal by more than 1,500,000 since 1940. There will be more newly-married couples in 1950 than ever before and the birth rate may be roughly 10% higher than in the early 1930's. So the 20th Century Fund looks for an increase of 12 million in total population between 1940 and 1950 and a further increase of 10 million in the 1950's.

This will mean a faster-growing market for homes, autos, food, clothing, and other consumer items than we had in the 1930's. It will mean crowded schools and more people seeking jobs.

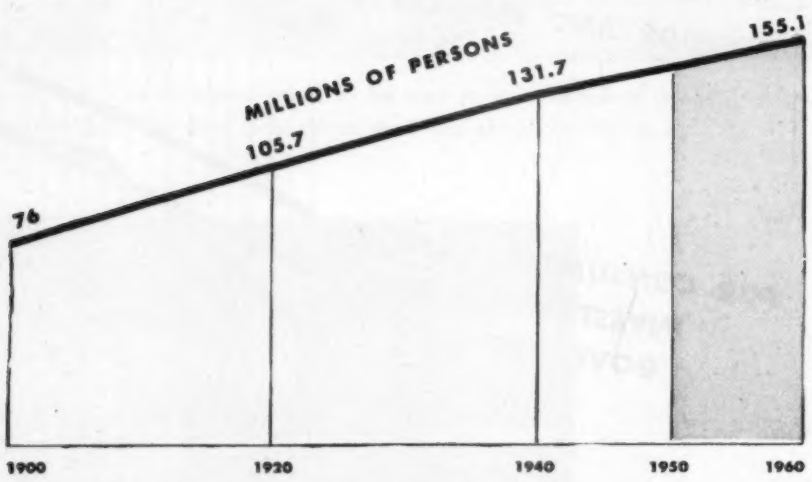
There are four major population trends which will affect markets in the 1950's:

1. The number of families will continue to increase more rapidly than the number of people as families grow smaller. This is significant because the market for housing, appliances, and many other things depends more on the number of families than on the number of people.

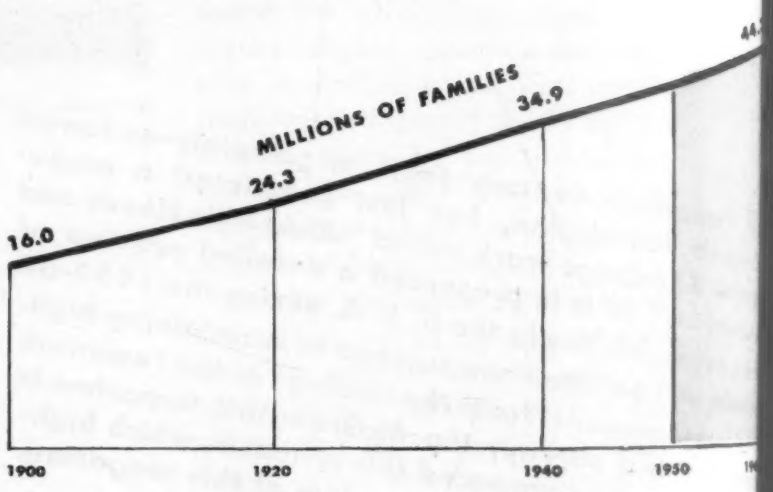
2. Our population will be getting older. But it will not be getting less productive because the proportion of the population between the ages of 20 and 60 will be higher than in past decades. Still, the most striking increase will take place in the number of people over 60—from 14 million in 1940 to more than 20 million in 1960. This will bring greater demand for medical services and social security. An important cause of this trend is our success in controlling communicable disease. The following table shows how the death rate from selected causes has changed since 1900.

	Death Rate Per 100,000 Persons	
	1942	*1900*
Diseases of heart	295	137
Cancer and other malignant tumors	122	64
Influenza	56	202
Tuberculosis	43	194
Diarrhea and enteritis	9	143
Whooping cough	2	12
Diphtheria	1	40
Measles	1	13
Typhoid and paratyphoid fever	0.5	31
Scarlet fever	0.3	10
Other	505.2	873
	1035.0	1719

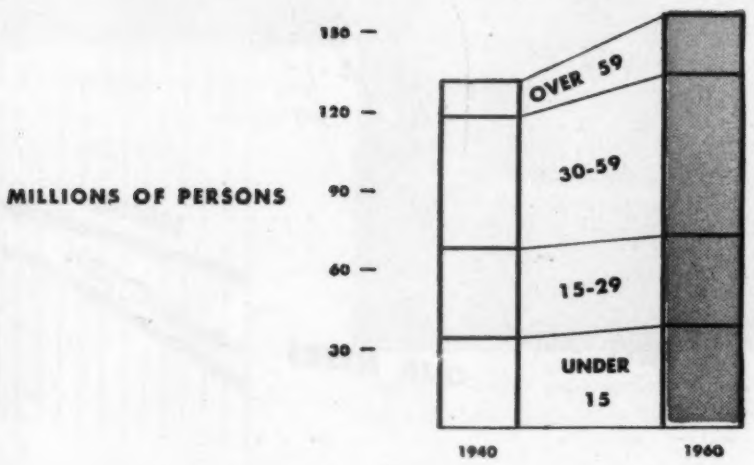
TWICE AS MANY PEOPLE



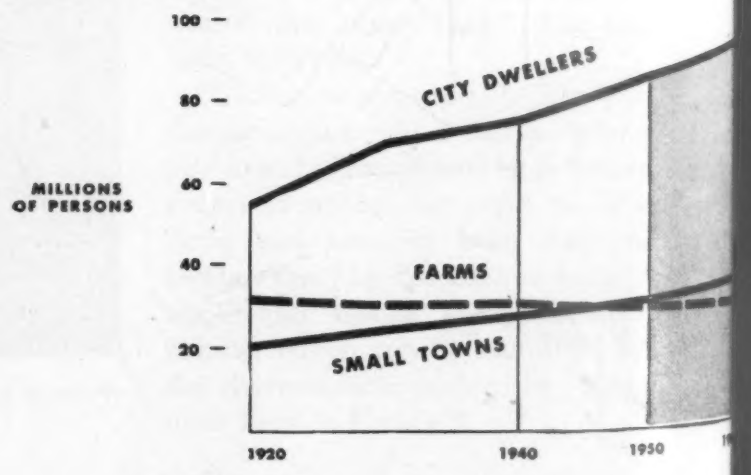
BUT THREE TIMES AS MANY FAMILIES



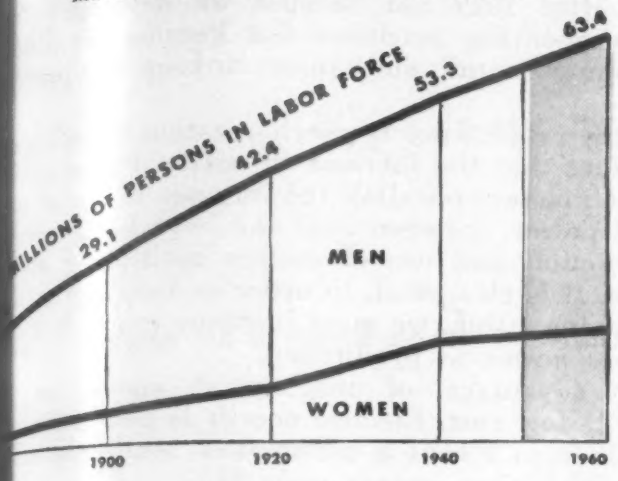
MORE OLDER PEOPLE



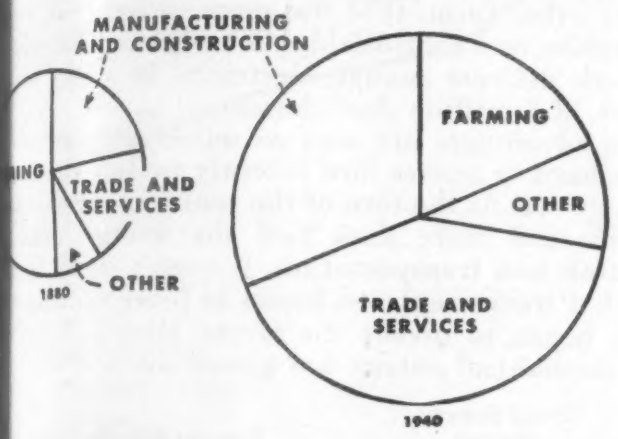
MORE CITY DWELLERS



MORE AND MORE WOMEN ARE SEEKING JOBS

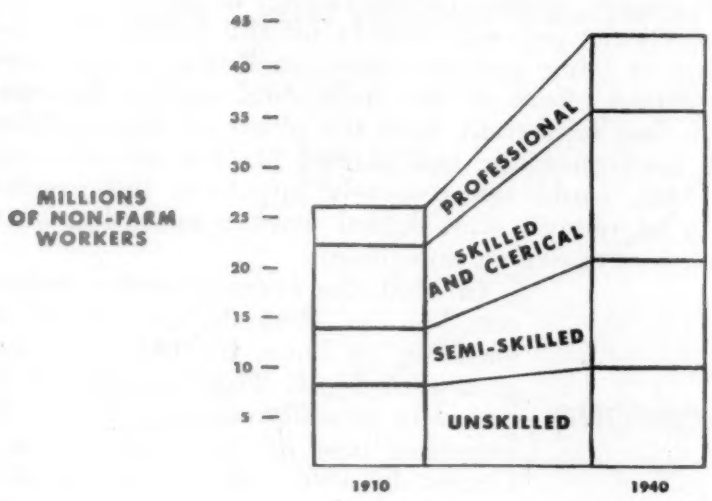


FARMING IS GIVING WAY TO OTHER OCCUPATIONS



ANATOMY OF THE LABOR FORCE

THE LABOR FORCE IS GROWING MORE SKILLED



. The population will continue to become more banized. Small and medium-sized cities will grow ter than the largest cities. The general westward gration which was accelerated by the war will con-ue.

. Our people will keep on getting more homo-eous. There has been almost no immigration since 9, so the number of immigrants who have been in country for less than 20 years will make up less n one percent of the population in 1950 as against % in 1930.

An even more important factor in making the pop-tion all of a kind has been the growth of universal ca tion. The proportion of children 14-17 years old ending high school doubled between 1920 and 6. The rise of the radio, movies, and national maga-es has also levelled us out. These developments not y raise the general educational level of the nation also tend to standardize the public's tastes and itudes.

OR FORCE

The volume of goods and services produced by 145 lion persons in 1950 and 155 million in 1960 will end on what share of the population is in the labor rket and the amount of work those employed ually do. The proportion of the population in the or force has shown little change in the past few cades. So the 20th Century Fund assumes that the ationship between labor force and population will about the same in 1950 and 1960 as it was just be-e the war. On this basis 60 million people will in the labor market in 1950 and 63.4 million ten rs later.

As you can see from the charts, however, there will several important changes in the composition of labor force. More women will be working. In 1870 y one out of every eight worked. By 1940 the proportion had grown to one out of four, and evidently will go on rising.

However, the increase in the number of women working will just about be offset by earlier retirements and longer schooling. This explains why there is little change in the ratio of labor force to population.

UNEMPLOYMENT

The effectiveness of the labor force depends not only on its size but on how fully it is employed. We have never had full employment in the sense that everyone able and willing to work had a job at the same time. Even in good years unemployment has seldom averaged less than 5% of the working force because workers are always moving from job to job. And in 1932, nearly one-fourth of all workers were unable to find jobs.

For this reason, the 20th Century Fund assumes that, even with good business in the 1950s, unemployment will average 5% of the labor force. This works out to 3 million unemployed in 1950.

In addition, the Fund expects the long down-trend in average weekly hours to continue. A century ago, workers put in a 12 hour day for 6 days a week. By 1940 the average work-week had declined to 44 hours in non-agricultural jobs and 52 hours in agriculture. If this trend continues, the average in non-farm jobs will be down to 38 hours a week in 1960, and farmers will work 48 hours.

Adding all this up, and allowing for vacations, absenteeism, and sickness, the 20th Century Fund estimates that the U. S. will put in 121 billion man-hours of work in 1950 and 118 billion in 1960. This compares with 105 billion in 1940 and with 154 billion at the peak of the war effort. The quantity of goods and services that can be turned out with this amount of labor effort will depend on average output per man-hour, or productivity.

PRODUCTIVITY

The key to our future economic welfare is productivity. It is the five-fold increase in output per man-hour that has made it possible for us to work shorter hours and still enjoy a rising standard of living. This increase in productivity has been accomplished not by working harder but by constantly inventing better machinery to supplement human energy with mechanical power.

Of course, in any specific factory at any given time, productivity depends largely on the willingness and ability of labor and management. But over the years, the actual effort of the individual worker becomes much less important than the effort of the machine. The most energetic and skilled blacksmith of a century ago could not remotely approach the productivity of today's semi-skilled worker operating automatic power-driven equipment.

EACH PRODUCING MORE . . .

In 1860, the average worker turned out 33¢ (in 1944 dollars) worth of goods in an hour. By 1940, this had grown to $1.22. This sensational increase in productivity was due to the increased use of power-driven machines. In 1860, the average worker had the help of only half a horsepower of animal or mineral energy. In 1940, he had the use of 2.7 horsepower. To put it another way, if there had been no increase in the use of mechanical power since 1850, it would have taken 290 million workers to turn out the amount of goods and services actually produced at the peak of the war effort by only 63 million workers.

DO MACHINES KILL JOBS

Past history also shows that we need not fear the long run effects of the introduction of labor-saving machines. On the contrary, the only way we can improve the material welfare of everyone is to continue and even step up the rate at which we save labor by using machines.

Some people, it is true, are thrown out of work and a few of them may not be able to find other jobs easily. But mechanization more than compensates for "technological unemployment" by making it possible to produce more and better things for everyone—things that themselves create jobs. Development of the railroads and the automobile, for example, put a lot of canal boat and livery stable operators out of business. But it cut the cost of transportation and created many times more jobs than it eliminated.

The 20th Century Fund also points out that the most important reason that the technological revolution developed luxuriantly in the U. S. between 1850 and 1940 was that competitive enterprise provided a generally favorable climate. It is true that natural resources were plentiful and that the population was growing rapidly both in numbers and in skill. But what we had to a unique degree here was an atmosphere which favored risk-taking, fostered the vast capital investment necessary to harness and apply mechanical energy, and provided the incentives necessary to put capital and inventiveness to work.

No other economy has equalled ours in the ability to produce more and more with continually diminishing human effort. The test it now faces is whether it can eliminate the ups and downs in production and employment that have gone along with it. But an abundance of evidence indicates that we ran into trouble after 1929 not because we developed too many labor-saving machines but because we didn't adjust our economic mechanism to keep the process going.

The key importance of mechanization is indicated by the fact that the increase in national production since 1860 closely parallels the increase in use of mechanical power. Between 1860 and 1940, both volume of production and use of energy multiplied about 11 times. It is clear that, in order to keep our standard of living rising, we must continue to apply more and more power to production.

Chief advantage of mechanical energy is, of course, its low cost. Electric energy is now delivered for as little as a cent a horsepower, while the same amount of human energy costs $10.

And there are other important advantages. Mechanical energy can be delivered in greater concentration than any other form. It is also more convenient, compact, mobile, and controllable. Consolidated Edison in New York delivers enough electricity in a day to do the work of 3 million draft horses.

These advantages are now so universally accepted that it's hard to realize how recently we left the horse and buggy era. At the turn of the century, animals and men provided more than half the energy used in production and transportation. It wasn't until World War I that trucks replaced horses in local hauling and tractors began to invade the farms. Here is how the use of mechanical energy has grown since 1850:

	Total Energy Output (Billions of Horsepower-Hours)	Percent Supplied by:		
		Mechanical Energy	Humans	Animals
1850	17.6	6	15	79
1860	25.2	7	14	79
1870	27.8	12	15	73
1880	39.9	17	14	69
1890	61.1	28	12	60
1900	82.9	38	10	52
1910	131.4	57	8	35
1920	197.4	73	6	21
1930	238.3	84	5	11
1940	289.4	90	4	6
1950	410.4	94	3	3
1960	489.8	96	2	2

PRODUCTIVITY IN THE FUTURE

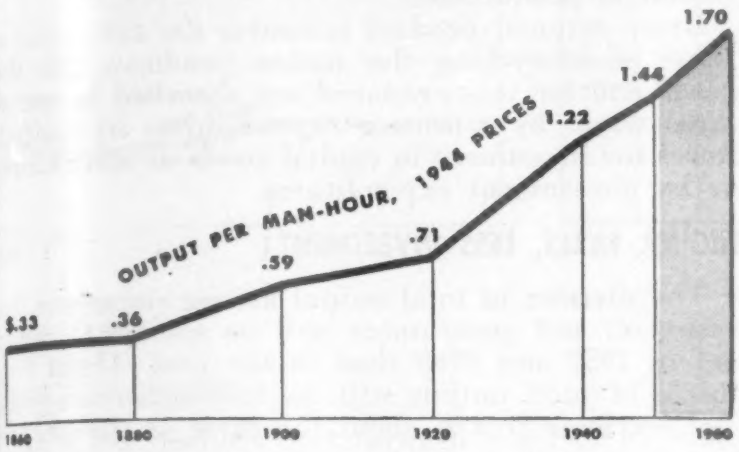
Any attempt to predict future developments in productivity is complicated by the fact that the changes do not occur at an even rate. Between 1850 and 1940 the average increase in output per man-hour was 18% per decade. But the changes varied all the way from 3% between 1870 and 1880 to 42% for the decade ending in 1940. There is, therefore, no simple way to extend past trends to obtain a foolproof figure for productivity at a future date.

For purposes of this study, however, the 20th Century Fund assumes that the average rate of increase since 1850 may be projected to estimate output per man-hour in 1950 and 1960. Thus, output per man-hour works out to $1.44 in 1950 and $1.70 in 1960 against $1.22 in 1940 (all in 1944 dollars).

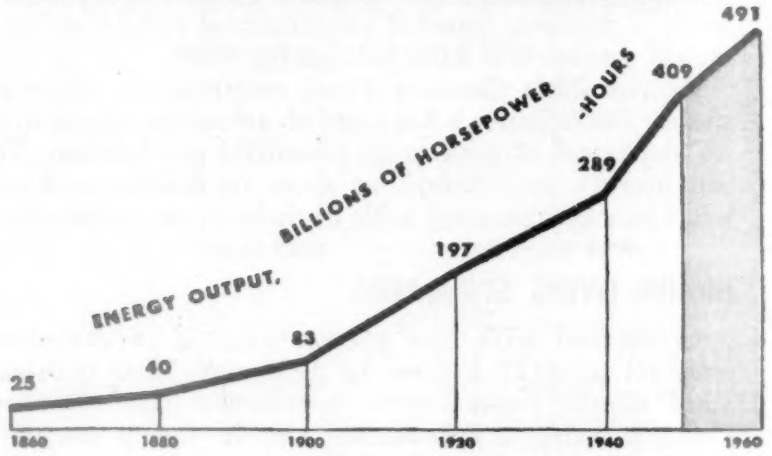
As the Fund points out, this is a critical assumption, and it is further complicated by the fact that there is a wider possibility of error in this estimate than in most of the others in the study. If, for example, it is assumed that productivity will increase at the pace set from 1920 to 1940 which averaged 3% per decade, then 1960 production would be about double the 1940 level instead of only 157% of it in the 20th Century Fund estimates.

A CENTURY OF ECONOMIC PROGRESS 1860 – 1960

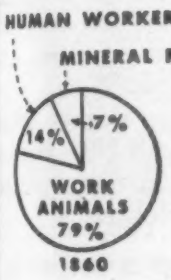
OUTPUT PER MAN-HOUR SHOULD BE 5 TIMES AS GREAT

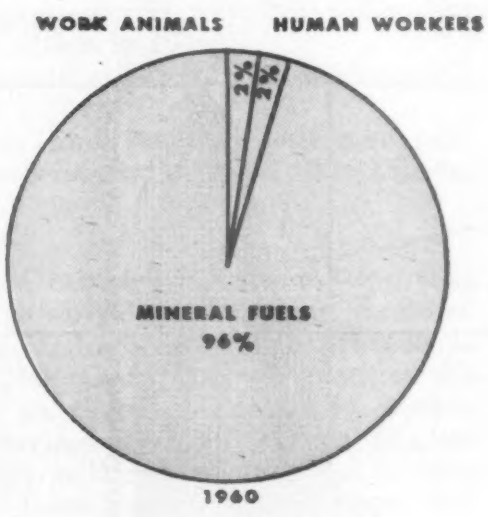


BECAUSE OF A STEADY GROWTH OF POWER AND MACHINES

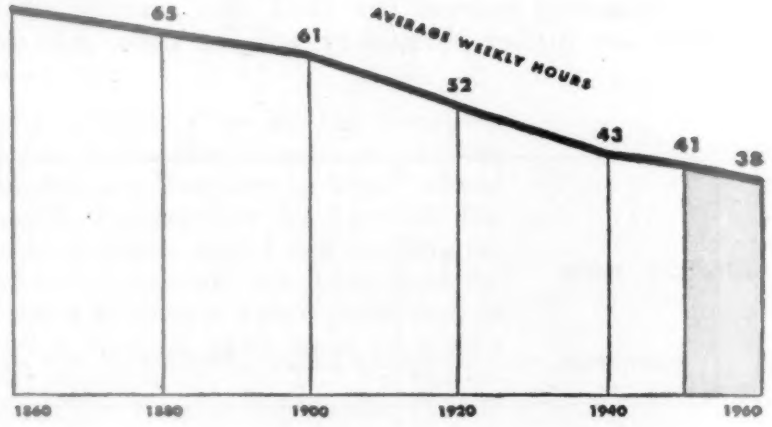


SO WITH LESS EFFORT

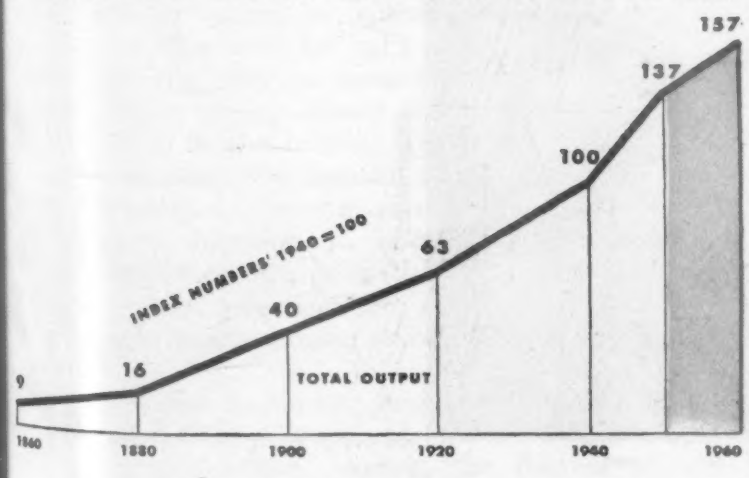




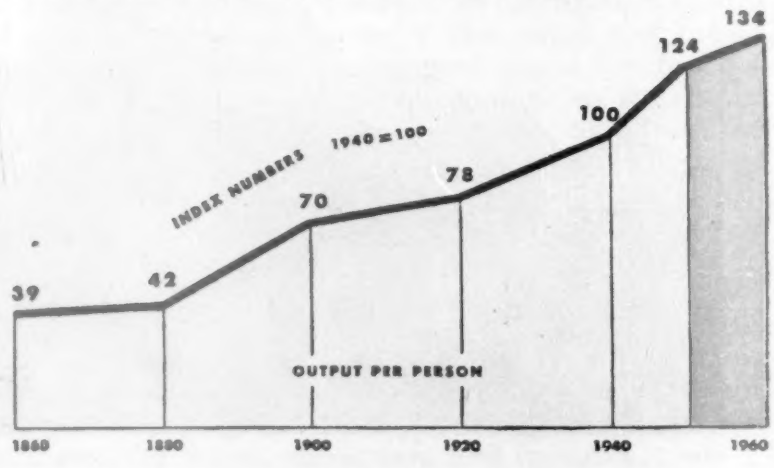
AND A SHORTER WORK WEEK



6 TIMES AS MANY WORKERS CAN PRODUCE 17 TIMES AS MUCH



AND PROVIDE 3½ TIMES AS MUCH OUTPUT FOR EACH PERSON



TOTAL NATIONAL OUTPUT

The potential volume of goods and services in 1950 and 1960 can be determined by simple arithmetic, using the assumptions outlined on the preceding pages. Of an estimated population of 145 million in 1950, about 60 million persons will be in the labor market and 57 million of them will have jobs if we succeed in keeping business activity at a high level.

This many people would work 121 billion man-hours. With output per man-hour estimated at $1.44 (in 1944 dollars) the total value of goods and services produced, or the gross national product, would come to $177 billion. Similar calculations yield a gross national product of $202 billion for 1960.

As the 20th Century Fund emphasizes, these estimates are neither a forecast of actual production nor an appraisal of maximum potential production. They are merely an attempt to show in dollars and cents what can be achieved with high-level employment.

HIGHER LIVING STANDARDS

Compared with any prewar year, a gross national product of $177 billion in 1950 and $202 billion in 1960 would represent a handsome gain. It would make possible a substantial rise in living standards. In 1950 we would produce a fifth more than in 1941.

CAN TURN OUT ENOUGH GOODS AND SERVICES . . .

However, the volume of goods and services turned out in 1950 would be only slightly higher than present production. This is because the number of persons at work today is 2 million above the estimated normal for 1950, and average weekly hours are higher than they will be then. Almost a million and a half of the emergency workers drawn into the labor force during the war are still at work and unemployment is lower than the figure assumed for 1950.

The estimates of 1950 and 1960 gross national product, as well as the figures for past years used in the chart, are expressed in 1944 prices. This is not a prediction that the price level will settle down to the 1944 level which would involve a drop of 18% in the cost of living and 26% in wholesale prices. It is merely a device to eliminate price fluctuations so that the figures will show only the actual changes in the physical volume of production.

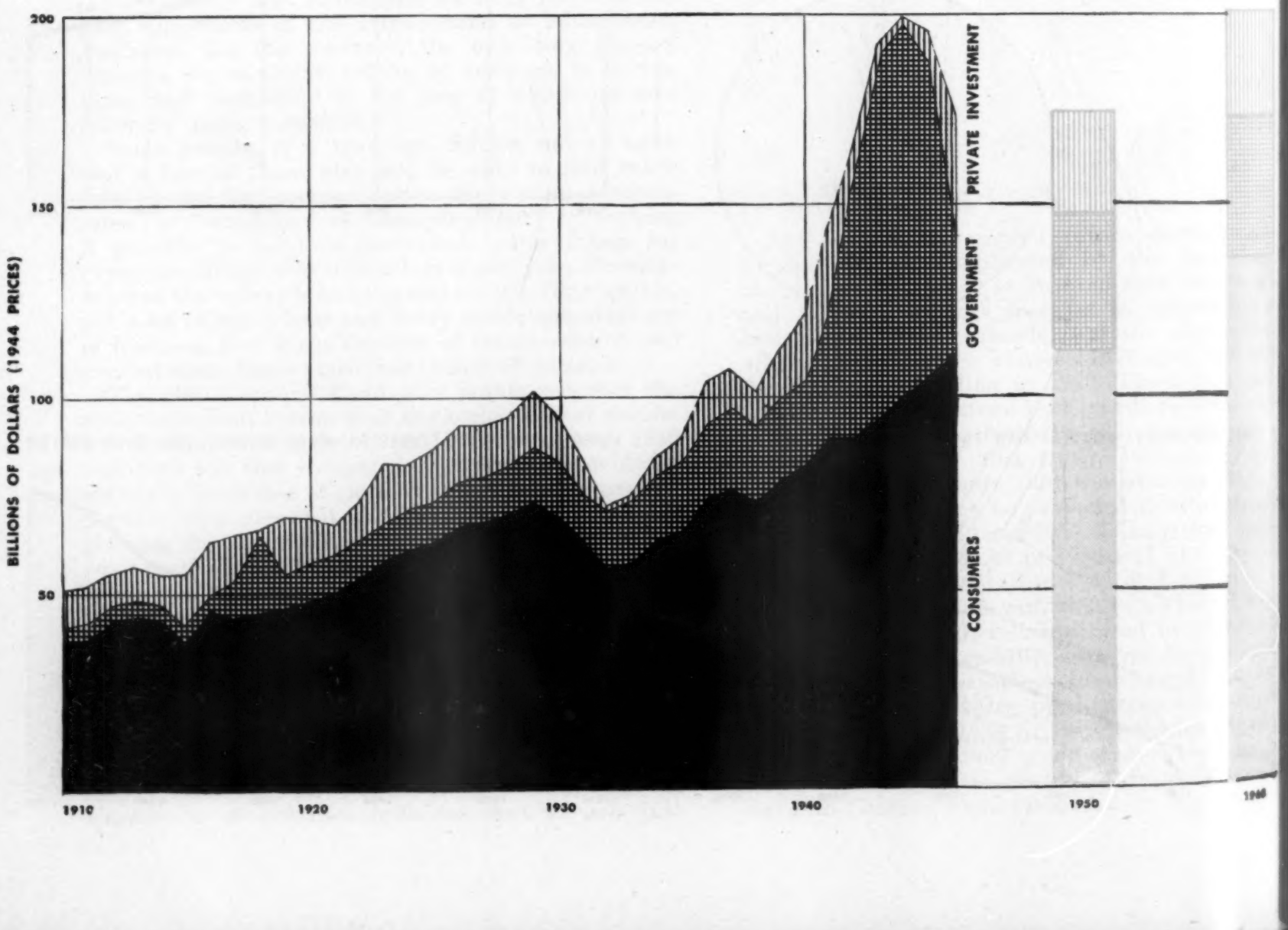
Gross national product measures the total market value of everything the nation produces. All the goods and services produced are absorbed in one of three ways: by consumer expenditures; by expenditures for investment in capital goods or inventories; or by government expenditures.

HIGHER TAXES, LESS INVESTMENT

The division of total output among consumers, investment, and government will be somewhat different in 1950 and 1960 than in the past. About two-thirds of total output will go into consumer goods and services. This is about the same as the proportion in prewar years.

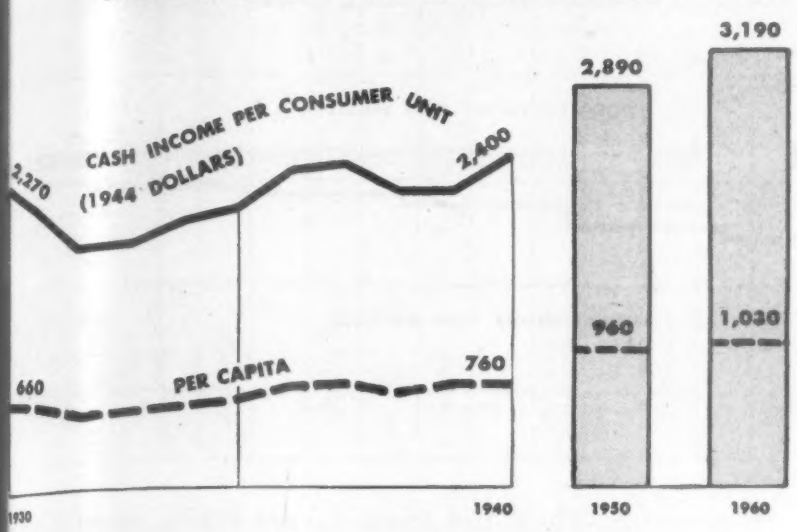
Government's share will continue to grow, however. It rose from 11% of total output in 1929 to 17% in 1940. At the peak of the war effort, half of all production went to Uncle Sam. Government expenditures have dropped to less than half the war peak and they will continue to decline slowly. But government's share will still run to around 20% in the 1950's. On the other hand, the ratio of investment to total output shows a slight long term decline.

HOW TOTAL OUTPUT IS DISTRIBUTED

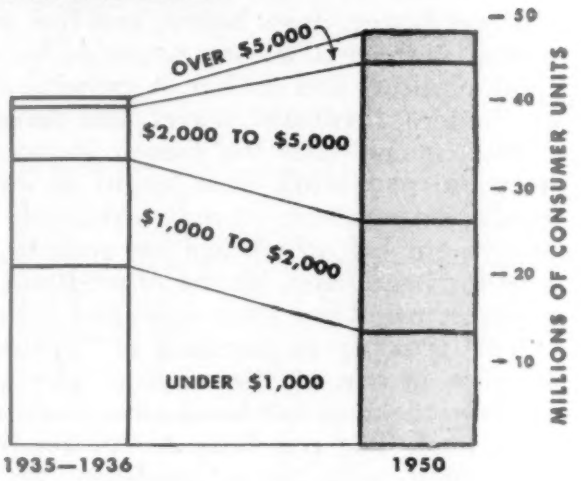


MORE CONSUMER PURCHASING POWER

CONSUMERS WILL BE ABLE TO BUY 50% MORE THAN IN 1930'S



EVERY OTHER FAMILY... INSTEAD OF EVERY SIXTH FAMILY... WILL HAVE $2,000 OR MORE TO SPEND.



CONSUMER INCOME

U. S. business can look forward to a 1950 consumer market twice as large as in the worst year of the depression, half again as large as in 1929, and one-fifth larger than in 1941. That is the major conclusion of the 20th Century Fund's analysis of consumer purchasing power. Here are the steps by which it arrives at that conclusion:

1. With gross national product at $177 billion in 1950, past experience indicates that income payments to individuals would run to $138 billion.

2. Income tax rates are assumed to equal the 1942 schedules, so individuals would pay $11 billion in taxes (as against $19 billion in 1946).

3. Savings are estimated at $12 billion, or about 9% of income after taxes.

4. Subtracting taxes and savings, consumer purchases of goods and services would total $116 billion.

LOWER SAVINGS

Many experts would criticize the assumption that savings will amount to only 9% of income. Some of them look for a ratio as high as 20% in prosperous postwar years. The 20th Century Fund justifies the use of a low figure on three grounds: (1) people built up reserve of savings during the war; (2) expanding social security will reduce the need to save for old age; and (3) taxes will cut into savings. The Fund's estimate of savings plus taxes in 1950 adds up to a higher percentage of income than in prosperous prewar years.

The standard of living won't rise as rapidly as the total income going to consumers, because the increased income will be split up among more family units. But the average consumer unit (a family or a single person living alone) will be a third better off in 1960 than in the 1930's.

Shifts in the distribution of income will be even more important, from a marketing standpoint, than the general increase in over-all consumer income. More consumer units will be in the over-$2000 brackets than ever before and this group will be receiving a much larger share of total consumer income.

Part of the apparent increase in income is cancelled out by higher prices. To show the actual increase in purchasing power, the figures should be adjusted for an estimated one-third increase in the 1950 price level over that of the mid-1930's. This would mean that a $2,650 income in 1950 would buy no more than a $2,000 income in 1935-36. Even if this adjustment is made, the resulting figures still show a striking upward shift.

Income Class	Consumer Units in Millions		Cash Income in Billions	
	1935-56	1950	1935-36	1950
Total	39.2	47.9	$85.0	$135.0
Under $1000	20.8	13.0	17.0	7.7
$1000-2000	12.2	12.9	28.1	21.5
$2000-5000	5.5	18.2	23.8	62.1
Over $5000	0.7	3.8	16.1	43.7

In addition to dollar income, shown in the above table, consumers also receive "income in kind"—food and fuel produced by farmers for their own use, board and lodging received by domestic servants. Such income will have a value estimated at $3.3 billion in 1950, most of which will supplement the $7.7 billion received by those in the "under $1000" bracket.

FOR CONSUMERS

The urban market will continue to be far more important than the rural market. Consumer units in cities will receive cash incomes of $3,445 on the average in 1950, more than twice the farm average of $1,635 and almost twice the small town average of $1,880.

THE FARM MARKET

These figures don't provide an accurate measure of the relative importance of the rural and urban markets because rural consumers pay a lot less for food, fuel, shelter and so have more to spend for other things. If there were any way to adjust for these things, the figures would show a smaller spread between the two markets, but the urban market will still be dominant.

All these figures underline a general upgrading in consumer demands which would accompany high-level production and employment. It will have a profound effect on marketing practices. The average person will eat better, dress better, and live in a better house with better equipment. And he will have more money to spend for travel, recreation, and luxuries.

CONSUMER MARKETS

The improvement in living standards during the 1950 decade will lead to important changes in the way consumers spend their dollars. Even though they will eat better, dress better, and live in better houses, a smaller share of the consumer dollar will be spent on food, clothing and shelter. A growing share will go for appliances, furniture, travel, and recreation.

This means that the fastest growing markets will be those providing what might be called "optional" goods and services — things which add to comfort and enjoyment but which are not strictly necessary. Markets for necessities, on the other hand, will expand at a slower rate than total consumer expenditures.

The growing importance of "optional" goods and services is one of the reasons why it's increasingly difficult to keep our economic machine going on an even keel. The purchase of "optional" goods can be postponed with little hardship. So anything that causes people to put off buying a new car, a new house, or a new radio has a far greater effect on production and employment now than it did when the major share of the consumer dollar went for necessities.

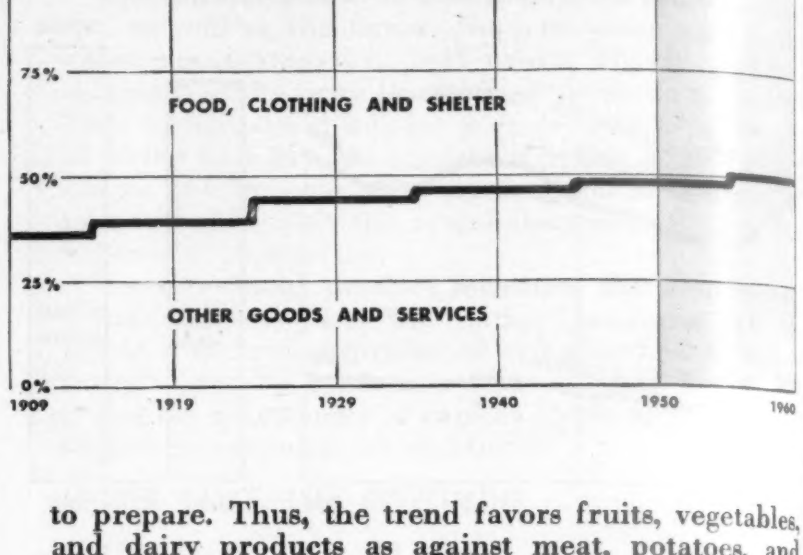
Some of the trends in major markets are summarized in the following sections.

FOOD

Although food is by far the largest item in the consumer budget, its relative importance is declining slowly as living standards rise. People eat the same number of pounds of food they ate in 1909 but the food is better from a nutritional standpoint and easier to prepare. Thus, the trend favors fruits, vegetables, and dairy products as against meat, potatoes, and bread.

More and more food is being processed in factories rather than in consumer kitchens. Improved methods of manufacture and distribution have transformed the luxury foods of yesterday into the standard foods of today. New kinds of processed foods — canned, frozen, and dehydrated — are appearing constantly.

STANDARD OF LIVING YARDSTICK: MORE OF THE CONSUMER DOLLAR GOES FOR THE COMFORTS OF MODERN LIFE



CLOTHING

Three long term trends will shape the clothing market in the future: (1) the shift from home and custom to factory fabrication is almost complete;

WHERE CONSUMER DOLLARS GO

(Figures in Billions of Dollars)

	1909	1919	1929	1940	1941	(1944 Prices) 1950	1960
Total Consumer Expenditures	28.8	60.8	80.3	70.6	80.4	116.2	134.2
Food, Liquor, and Tobacco	9.9	22.3	23.7	21.9	25.3	36.2	41.1
Food	7.4	18.8	19.9	16.4	19.0	27.2	30.8
Liquor and Tobacco	2.5	3.5	3.7	5.5	6.3	9.0	10.3
Clothing and Personal Care	4.4	9.8	12.1	9.8	11.5	16.2	18.7
Housing	6.8	10.1	14.4	12.6	13.3	19.3	21.4
Rent a.	5.5	7.9	11.3	9.1	9.7	14.0	15.4
Fuel	1.0	1.5	1.7	1.7	1.8	2.5	2.8
Electricity	0.1	0.3	0.6	0.9	1.0	1.6	1.8
Household Equipment and Operation	2.8	6.2	10.6	8.7	10.3	15.0	17.4
Appliances	0.2	0.4	0.8	1.0	1.3	1.8	2.4
Consumer Transportation	1.6	5.2	8.6	7.3	8.6	12.7	16.4
Autos and Private Planes b.	0.6	3.5	6.0	5.7	6.8	9.6	12.7
Local Bus and Street Car	—	—	0.8	0.7	0.8	1.5	1.5
Intercity Bus	—	—	0.1	0.1	0.2	0.2	0.2
Airlines	—	—	c.	c.	c.	0.1	0.5
Railroads	0.4	0.8	0.6	0.3	0.3	0.4	0.3
Medical Care, Insurance, and Death Expenses	1.1	2.8	4.5	4.7	5.2	7.7	8.7
Recreation	0.9	2.1	3.8	3.3	3.7	5.7	6.9
Radio and Television Sets	0.2	0.7	1.0	0.6	0.8	1.1	1.3
Private Education, Religion, and Welfare	1.2	2.2	2.7	2.3	2.4	3.4	3.7

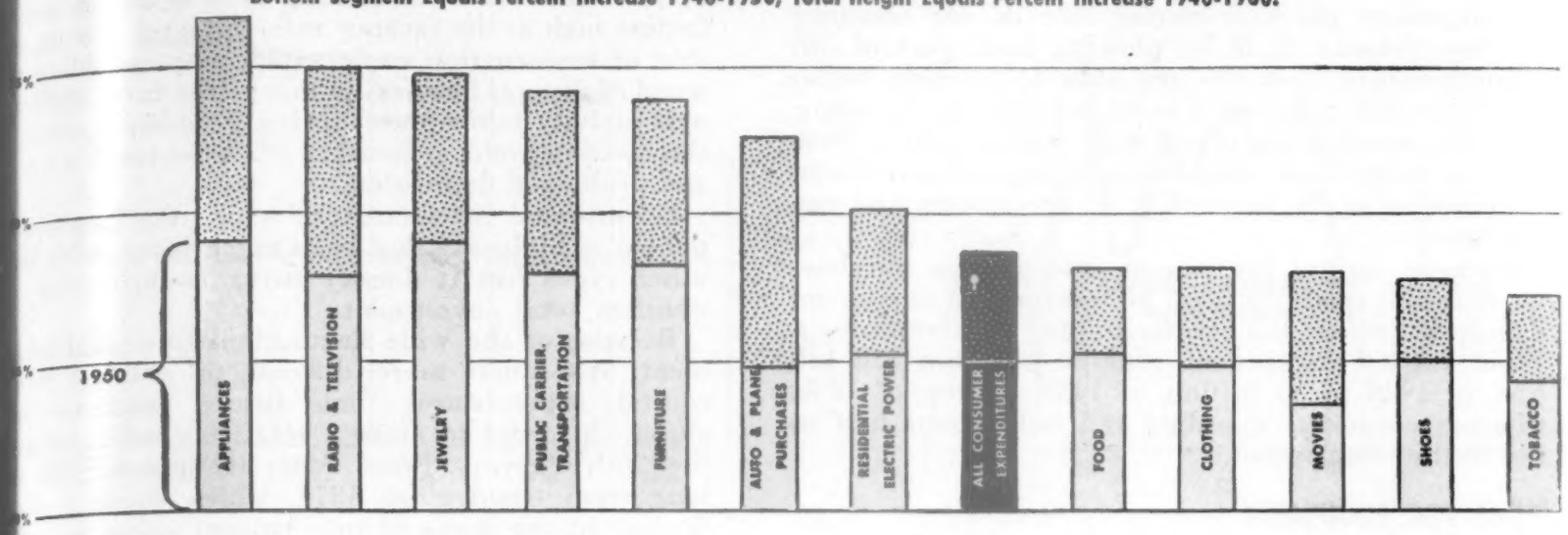
a. Includes Estimated Rent for Owner-Occupied Homes.

b. Includes Original Cost and Operating Expenses.

c. Less than $50 Million.

CONSUMER MARKETS IN 1950 AND 1960: Percent Increase in Sales Over 1940

Bottom Segment Equals Percent Increase 1940-1950; Total Height Equals Percent Increase 1940-1960.



2) synthetics, chiefly rayon and nylon so far, are placing cotton, wool, and silk at an accelerating ace; (3) there's greater standardization of styles and trend to lighter and simpler clothing.

In 1909 consumers spent 14% of their income for lothing but by 1940 the ratio had reclined to 12%. lowever, this long run decline may be halted or re- ersed. The migration from farms to cities, the up- rading of incomes, and the growing demand for orts clothing will increase clothing expenditures.

OUSING

The decline in the relative importance of housing xpenditures — from 24% of consumer dollars in 1909 less than 18% in 1940 — is expected to continue. he reason is that people feel they get more value for their dollars in other things than housing. Nevertheless, the housing market should be much larger in the 1950's than in the 1930's because much of our housing needs to be repaired or replaced.

A Census survey in 1940 showed that 16 million of the nation's 37 million dwelling units needed to be replaced or needed major repairs. The 20th Century Fund estimates that the provision of adequate housing for everyone by 1960 would involve building 20 million new units and rehabilitating 5.4 million at a total cost of $115 billion (1944 prices). The Fund also estimates that we will fall 15% short of this goal even with continued high-level employment.

HOUSEHOLD EQUIPMENT

More and more of the consumer dollar has gone for household equipment in the past four decades, largely because of the development of labor-saving appliances. The outlook is for a continuation of this trend. New appliances are being developed; and the large number of new houses slated to be built in the next few years, the wartime and postwar boom in the number of families, and the migration to the cities should add to appliance demand. The same factors should brighten the outlook for furniture, rugs, and other household items.

Some appliance markets may be saturated by the 1950's, however. A few years of high production would fill our homes with refrigerators, for example. However, replacement demand would run to 2.7 million units in 1960 and there would be a demand for 1.3 million refrigerators to equip new houses, so the market would still be bigger than in 1941 when 3.6 million were sold. However, new products must be developed if the industry is to keep up the pace it has set in the past.

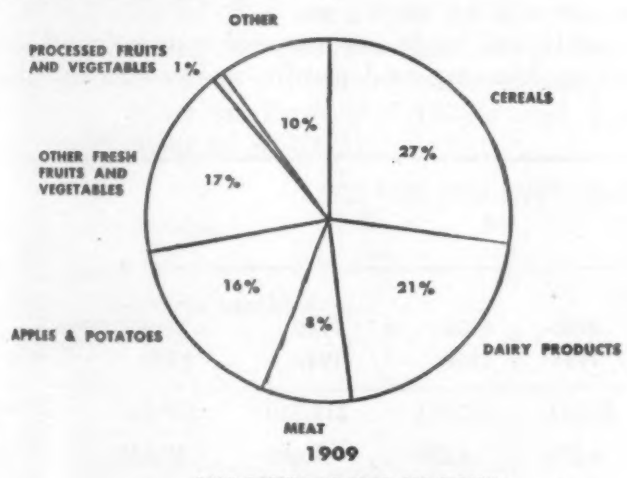
TRAVEL

In 1916 the average person traveled 490 miles. By 1940 the average had grown to 2,400 miles, chiefly because of the rise of the automobile. The 20th Century Fund expects this growth to continue because as their incomes rise people spend more money traveling.

A good share of the increased spending will go to purchases of cars and planes. The Fund estimates that there will be 36 million cars on the road and 100,000 private planes in the air in 1950. The auto industry would be able to sell 5 million new cars a year after 1950 — 4 million for replacement and a million for population growth.

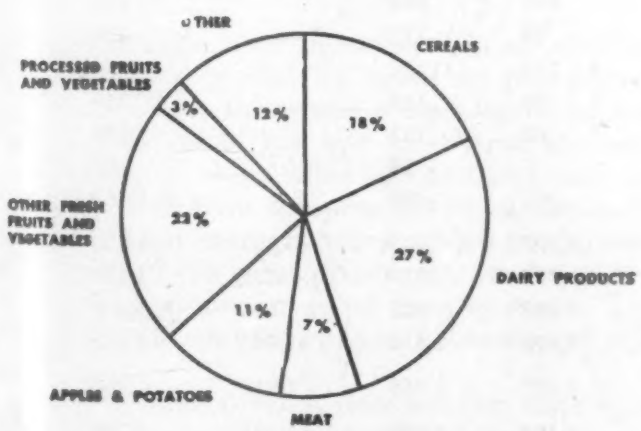
OUR CHANGING DIET: MORE MILK, FRUITS AND VEGETABLES

ESS MEAT, POTATOES AND BREAD



1909

1880 POUNDS OF FOOD PER PERSON



1939

1882 POUNDS OF FOOD PER PERSON

CAPITAL INVESTMENT

Investment plays a crucial role in our economy for two reasons. It is by plowing back part of our annual output that we are able to provide better machines and equipment to keep productivity rising. But the amount ploughed back varies widely from year to year. This unevenness of capital investment contributes to the instability of production and employment.

Because capital investment involves the purchase of durable goods, it can be postponed almost indefinitely when the outlook for profits darkens. Thus, capital investment plummeted from $18 billion in 1929 to $5 billion in 1933, a drop of 72%, whereas consumer spending fell only about half as fast in the same period.

MORE FOR EQUIPMENT

There has been an important shift in the relationship between construction and equipment, the two major types of investment. Before World War I, construction made up around three-fourths of total investment but the ratio declined to less than half in 1935-39. Part of the decline is, of course, explained by the fact that the depression left us with ample plant capacity but provided an incentive to buy more efficient machines to cut costs. Nevertheless, there is a well-defined trend towards allocating an increasing proportion of investment to equipment rather than to plant construction.

CAPITAL INVESTMENT . . .

A little less than two-thirds of total investment goes into industrial plants and equipment. Housing and other consumer construction (hospitals, schools, churches) averaged 27% of total investment during the interwar period. Housing fell from a peak of $6 billion in 1926 to $4.7 billion in 1929 and $600 million in 1933; and it had recovered only half the 1926 volume by 1940.

While other types of investment follow the ups and downs in general business, investment in housing construction follows a cycle of its own. This housing cycle is determined by factors such as the vacancy rate, the level of rents, and that of construction costs, which may not follow the trend of general business. When a drop in general business activity takes place during a declining phase of the housing cycle, as it did in 1929, the result is a deep and prolonged depression.

Government investment, of which the largest component is highways, has been much more stable than other types but it doesn't swing enough weight to stabilize total investment.

Because of the wide fluctuations in capital investment, it's much more difficult to estimate future capital expenditures than future consumer purchases. In order to make a relatively stable forecast the 20th Century Fund bases its estimates on the long term trend since 1879, which shows a slight decline in the share of total output going to capital investment. Thus, investment under conditions of stable prosperity in the 1950 decade is estimated at 16% of total output as compared with a ratio of more than 18% in the late 1920's. On this basis estimated capital expenditures work out to $28 billion for 1950 and $33 billion in 1960. Our ability to maintain high employment and rising living standards will depend in large measure on our ability to invest that much profitably in new machinery and buildings.

CAPITAL NEEDS

Analysis of our capital needs lends little support to the idea prevalent during the 1930's that we have reached economic maturity so that there was no way to invest as much as we had in earlier decades. No one has ever made an estimate of how much it would cost to modernize our industrial plant, which is valued at around $200 billion at prewar prices. If as much as a third of it needs to be replaced or rehabilitated around $100 billion (current prices) of additional investment will be required.

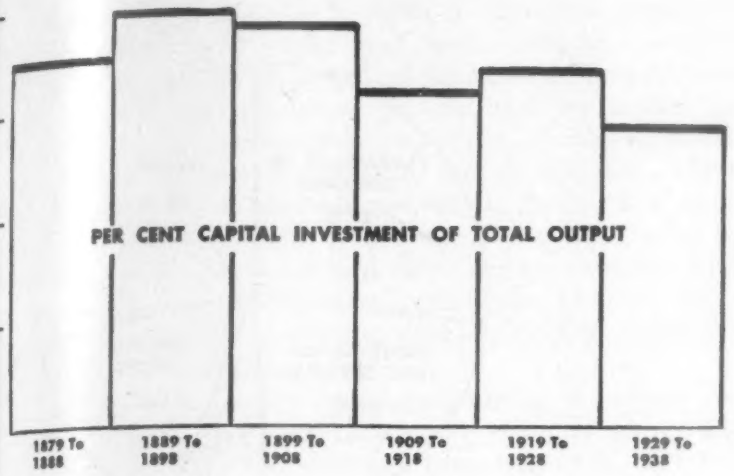
In addition, huge amounts of money need to be invested in housing and public works to raise the ser

WHERE INVESTMENT DOLLARS GO

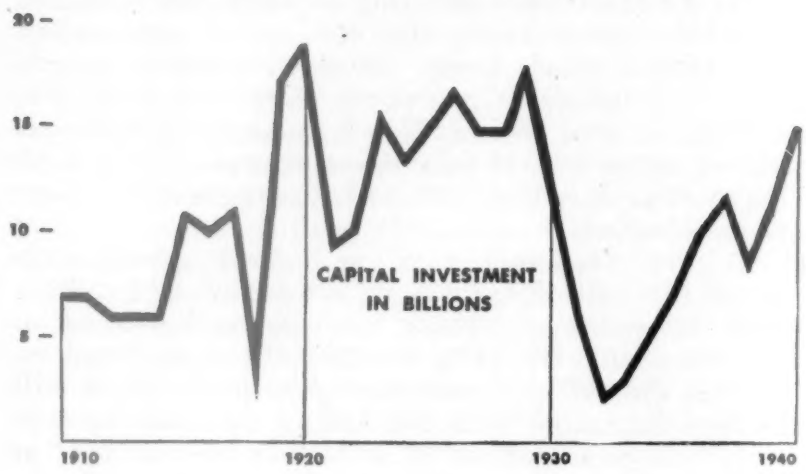
(Figures in Billions of Dollars)

	(Annual Averages)					(1944 Prices)	
	1920-1924	1925-1929	1930-1934	1935-1939	1940-1944	1950	1960
Total Capital Investment	$12,428	$17,186	$8,215	$10,445	$12,340	$27,700	$33,000
All Industries	7,570	10,112	5,272	6,889	8,089	17,800	21,125
Manufacturing	1,996	2,362	1,074	1,610	3,731	4,200	5,025
Food	261	357	194	244		228	273
Textiles	227	212	92	117		175	210
Steel	138	188	110	192		853	1,021
Autos	105	150	78	146		369	441
Chemicals & Petroleum	70	95	68	142		928	1,111
Machinery	—	—	—	28		180	216
Other	510	625	213	409		1,462	1,750
Transportation	1,797	2,303	1,277	1,822	805	4,300	5,100
Commercial	1,196	1,940	777	719	833	1,950	2,300
Utility	693	999	483	422	780	1,500	1,625
Other	1,888	2,508	1,661	2,316	1,940	3,950	4,700
Consumer Construction	3,806	5,557	1,547	2,256	2,912	7,200	8,255
Government Construction	1,052	1,517	1,396	1,299	1,338	2,700	3,620

OVER THE YEARS ABOUT 1/5 OF TOTAL OUTPUT IS PLOWED BACK AS INVESTMENT



BUT THE AMOUNT PLOUGHED BACK VARIES GREATLY FROM GOOD YEARS TO BAD, ACCENTUATING THE SWINGS OF THE BUSINESS CYCLE



es provided merely to adequate levels. The 20th entury Fund estimates that the cost of a 15 year ogram to modernize our city streets and rural ghways would run to $40 billion. To bring the tion's housing up to minimum standards of health d decency by 1960 would cost $115 billion. To nserve our natural resources and develop our wa- power would cost $27 billion over a 15 year riod.

There seems to be little question that needs exist all the capital investment we can make for a long ne to come. The behavior of investment in the past ongly suggests that the problem is not one of lack needs but one of finding ways to add to our capital an orderly fashion. Capital investment has followed boom and bust route in the past; what is wanted a high but steady rate of investment.

RTIME INVESTMENT DEFICIT

Demand for capital goods is stronger right now n ever before, largely because of the backed-up eds arising out of the war. Here is how wartime penditures for capital goods which can be used in acetime production compared with expenditures the last 5 years of both the 1920's and 1930's: igures in billions of dollars)

	1925-1929	1935-1939*	1940-1944
al Capital investment	$86	$65	$49
ndustrial	51	43	32
Manufacturing	12	10	14
Metals, chemicals, machinery, petroleum	6	6	11
All Other	6	4	3
Commercial	10	5	3
Railroads	5	3	3
Electric power	5	3	3
onsumer Construction	28	14	12
ublic Works	7	8	5

djusted to Wartime Prices

Wartime restrictions held investment in all civilian es far below what would be spent in prosperous acetime years. Thus, there was a backlog of invest- nt needs at the end of the war which ran to more n $30 billion, if the 1925-1929 demand can be en as typical. Whatever the precise size of the back- , it is clearly great enough, when added to the nor- l yearly demand for new investment, to keep the vy goods boom going for some time to come. The of our ability to stabilize capital investment will ne later.

There is also a huge foreign demand for American ital. How far we will go toward meeting this de- ds largely on whether international political and economic conditions are stable enough to make private foreign investment a good risk.

If we invest abroad in the same proportion we did in the late-1920's, our foreign investments will total $1.6 billion during the year 1950 and $1.5 billion in the year 1960. This will mean a net increase in our foreign holdings of $15 billion during the 1950's, raising the total of such holdings to about $25 billion, as against a total of $10.6 billion in 1940.

To make that much foreign investment pay out, an expanding volume of world trade would be required. Foreign nations would have to get enough dollars not only to pay for goods they bought from us but also to pay interest and dividends on U. S. investments. If our overseas investments increase to $25 billion by 1960, annual interest and dividends owed us will run to almost $1¾ billion.

To pay us that much, foreign nations would have to sell much more in the U. S. than ever before. The 20th Century Fund calculates that imports of $7.3 billion in 1950 and $8.1 billion in 1960 would provide other countries with the dollars they need. Imports ran to $2.5 billion in 1940 so we would have to buy 3 times as much abroad to keep expanding our foreign investments.

With good business, U. S. demand for imported goods should be well above prewar. Rising living standards will widen the market for such consumer items as British tweeds and French perfumes. Moreover, we will need to import more raw materials than ever before because we used up our natural resources at a prodigious pace during the war.

NEW INDUSTRIES

The new methods, materials, and products developed during the war may well have a more profound and lasting effect on future capital requirements than the backed-up demands accumulated in wartime. Here are some of the wartime developments which may have important peacetime applications: new chemical processes and products including synthetic rubber, plastics, synthetic fibers and fabrics; new food products and new methods of food processing; new uses for glass, plywood, and the light metals; tremendous advances in aviation; and new applications of atomic energy and fissionable products in power production and medicine.

Large capital expenditures will be required to push these developments further and adapt them to civilian use. New businesses and perhaps entire new industries will grow up, adding to the demand for capital goods for many years.

THE COST OF GOVERNMENT

To the traditional certainty of death and taxes can be added the certainty that the cost of government will take a much larger share of national income than ever before in peacetime. After the Civil War and again after World War I, federal expenditures moved up to a level four times prewar. And it is already clear that World War II is going to have about the same effect.

In 1940, federal, state, and local governments spent $19 billion, of which a total of $2.2 billion went for national defense, veterans, and interest on the war debt. By 1950, the 20th Century Fund estimates that all governmental units in the U. S. will be spending more than $45 billion. Federal expenditures are estimated at $27.6 billion in that year as against $9 billion in 1940.

Part of the increase is explained by higher postwar prices. Adjusting for price changes would reduce the 1950 figure from $45 billion to $33.5 billion. This is still 80% above the 1940 level. Increased expenditures for public works, social insurance, and schools explain another small part of the rise.

But costs arising out of the war are by far the most important factor. Military and veterans' expenditures and interest on the war-swollen national debt will add up to over $17 billion in 1950. This is only 10% less than total government expenditures in 1940.

The only major category of government expense which would be lower in 1950 is welfare. With high-level employment and more social insurance, relief and other welfare costs should run to $2.5 billion in 1950 as against $3 billion in 1941.

The following paragraphs describe important trends in the major items of government expense.

MILITARY

The 20th Century Fund assumes that we will maintain an armed strength of 2 million men (including trainees) and that it will cost $3,300 to equip and maintain each man, so total military expenditures will run to $6.6 billion. But even if we decide to maintain a smaller armed strength, the total cost might easily be at least $6.6 billion because the present per serviceman cost of over $6,000 a year may not decline.

AND GOVERNMENT ...

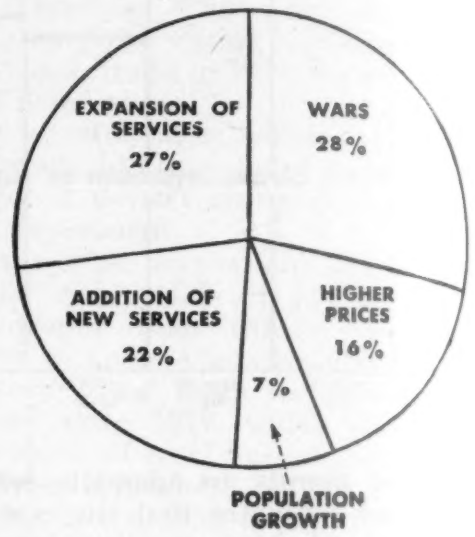
VETERANS

It will cost at least $2.9 billion to take care of veterans in 1950 even if benefits are not increased. That's 5 times the 1941 cost. Pensions for World War I veterans rose steadily from $116 million in 1924 to over $300 million in 1945. That rise will continue for another 20 years. By far the largest expense will be for World War II pensions which are already costing $900 million. Disability and death benefits will cost about $1¾ billion in 1950; hospitalization will add another $250 million; and insurance $150 million.

SOCIAL SECURITY

Future expenditures for social security will depend on whether steps are taken to extend coverage and liberalize benefits. Over 60 million people are now covered so the cost is certain to increase rapidly as more of them begin to draw payments. With high-level employment in 1950, estimated old age and unemployment benefits under the present system would run to over $5 billion. Expansion of benefits, as recommended by the Social Security Board, would raise the cost to over $9 billion.

WHY THE COST OF GOVERNMENT HAS INCREASED. The $25.6 billion increase in cost from 1913 to 1941 was due to:



PUBLIC WORKS

Even an economy-minded Congress is almost certain to go along with expenditures for highways, airports, waterways, flood control and conservation. Thus an increase in expenditures for transportation and natural resources from less than $2.5 billion to over $ billion in 1950 seems probable.

SCHOOLS

Education ranks third among all government expenditures. In 1941 we spent almost $2.5 billion 10% of all government dollars—on schools. Teacher salaries account for almost three-quarters of the total cost so the trend towards higher salaries will boost the nation's bill for education.

WHERE TAX DOLLARS GO

(Figures in Billions of Dollars)

	1913	1932	1941	1950 (1944 Prices)	1960
All Government Expenditures	2.5	12.4	23.1	45.5	50.7
Federal	0.7	4.3	12.9	27.6	28.6
State	0.2	1.8	3.6	7.0	9.3
Local	1.6	6.3	6.6	10.9	12.8
Military	0.27	0.7	6.1	6.6	6.6
Veterans	0.18	0.8	0.6	2.9	3.2
Interest	0.15	1.3	1.7	7.9	8.1
Social Insurance	—	0.2	1.9	7.7	8.7
Welfare & Health	0.31	1.5	4.1	4.0	4.5
Education	0.65	2.5	2.7	3.7	4.3
Public Works	a.	a.	a.	5.6	7.1
Transportation	0.40	1.9	2.0	1.8	2.2
Natural Resources	0.03	0.6	1.4	1.2	1.5
Police & Fire	0.19	0.7	0.7	1.0	1.3
Other	0.40	2.4	2.0	3.0	3.6

a. Included in other groups.

NATURAL RESOURCES

The war left the U. S. with a depleted supply of most natural resources, and with critical shortages of some of the most essential minerals. Nevertheless, lack of natural resources should not be a limiting factor on our productive capacity. With relatively free access to world markets, we should be able to get all the raw materials we need. And, even if we were denied access to world markets, we could use our low-grade reserves and develop substitutes without causing a prohibitive reduction in our living standards, though everyone would feel the effects in one way or another.

The U. S. economy consumes about a billion and a half tons of raw materials each year, or about 11.5 tons per person. Of this 3.5 tons are coal, 1.5 tons are petroleum, and iron and copper ore each contribute about a half a ton. In 1939 the value of unrefined minerals output was $4.2 billion and 2% of all workers were engaged in mining or lumbering.

FUTURE REQUIREMENTS

The level of industrial production projected by the 20th Century Fund would raise minerals requirements a third above 1940 by the year 1950 and 50% above 1940 a decade later. Here is how natural resources requirements in the 1950 decade would compare with 1940 and the wartime peak: (Index numbers, 1940 equals 100)

	Wartime Peak	*1950*	*1960*
All minerals	138	133	151
Metals	157	117	126
Fuels	130	141	164
Other	141	128	142
Lumber	126	93	76
Electric Power	159	173	224
Manufactured Gas	120	94	75

The capacity of our supplies of natural resources to support future levels of output cannot be determined with any great accuracy. It will depend on the size of our reserves and on our ability to use supplies more economically and develop substitutes.

TH THE
SOURCES
AILABLE . . .

Because there is no way to measure these factors with any degree of precision, all estimates of the number of year's supply are subject to wide errors. However, such estimates are useful in directing attention at those resources where every effort should be exerted to develop new supplies, substitutes, and more economical methods of use.

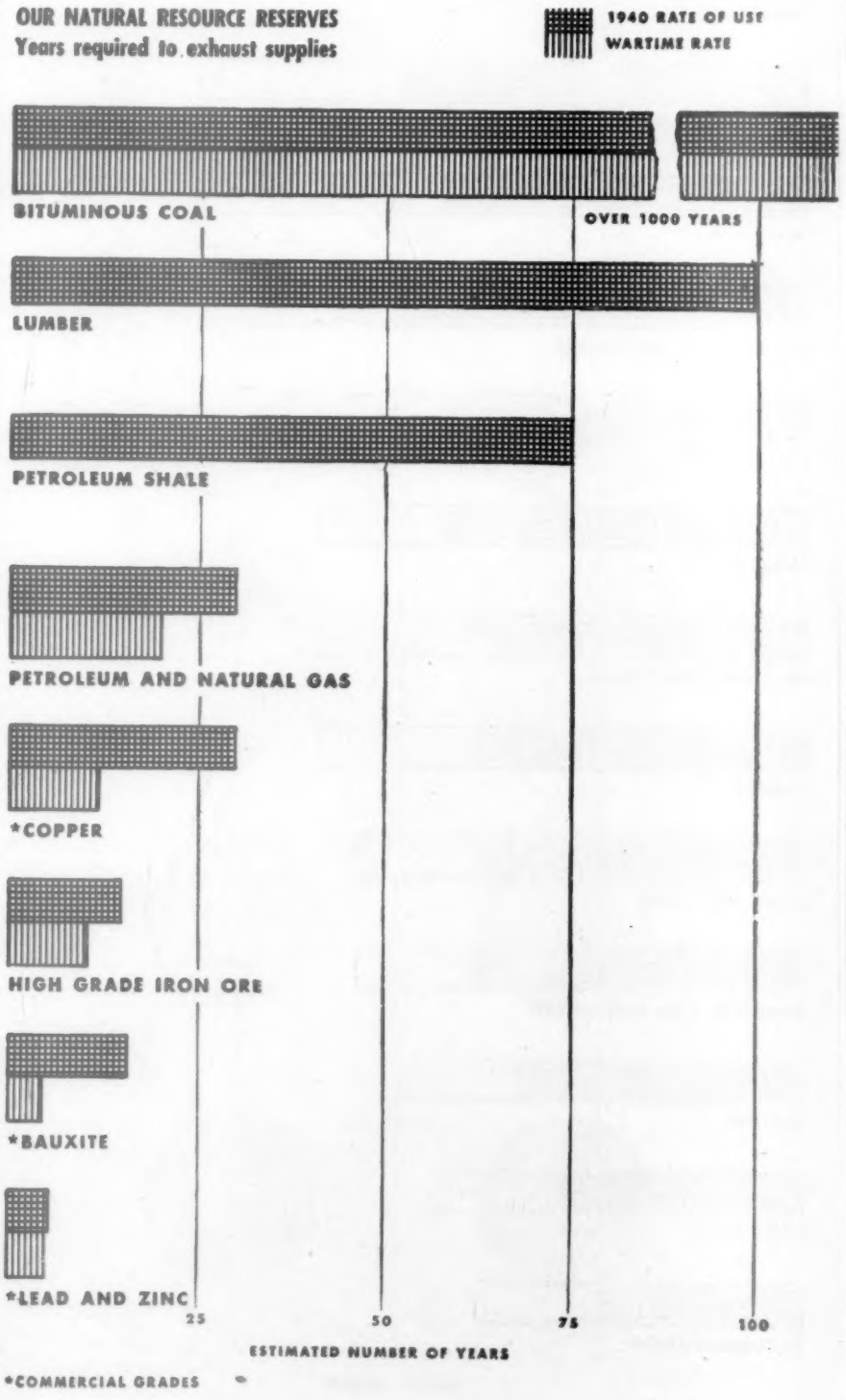
BIGGEST PROBLEMS: LEAD AND ZINC

Commercial grades of zinc, lead, and bauxite will be exhausted before 1960 even if the rate of use is cut to half the wartime rate. Supplies of petroleum and natural gas — which furnish 40% of our energy — will last longer than 20 years but their partial depletion will raise many technical and economic problems long before that time. Possible exhaustion of high-grade deposits of such minerals as iron and copper in the foreseeable future will stimulate development of processes to use low-grade deposits.

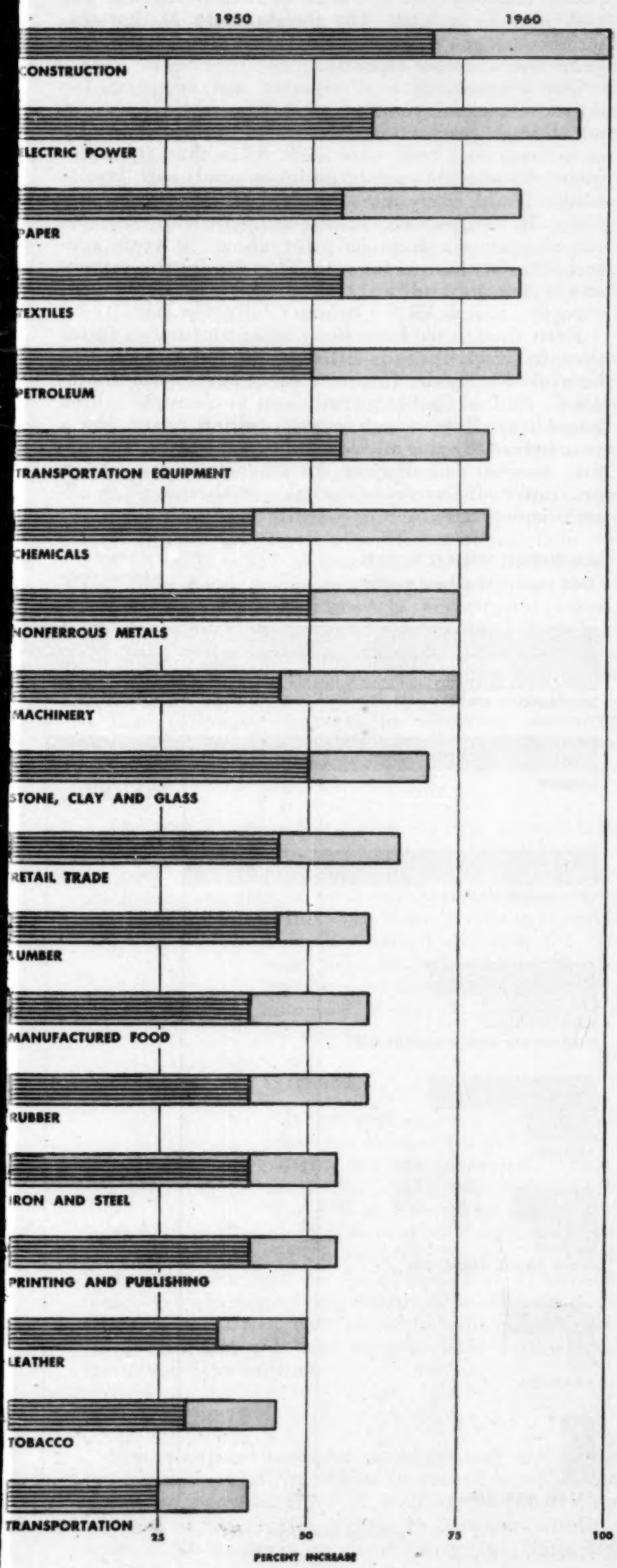
We have been discovering more and more ways to stretch our supplies of natural resources, however. In the case of tin, the electroplating process saves 50% of the tin used in tinplate production. The electric power industry uses less than 40% as much coal per kwh now as in 1920. The development of new materials and new ways of using old materials also expands our resource capacity.

Our bituminous coal reserves are adequate for over a thousand years even at the wartime rate of use, though production costs might rise substantially as inferior coal beds were used. After that, there are huge deposits of sub-bituminous coal and lignite which could carry us along for another thousand years. In comparison, maximum petroleum reserves are minute, adequate only for about 30 years consumption at the current rate. That is why the experts are trying to find ways to produce oil from coal cheaply enough to be commercially feasible.

Even though we have been using up lumber faster than it grows, there is little doubt that enough will be available in the future to meet at least minimum needs. Annual timber growth runs to about 32 billion board feet. But we cut over 40 billion board feet a year before the war and lost another 6 billion through fire, insects, and disease. An adequate conservation program could increase annual growth enough to offset this depletion.



PRODUCTION PROSPECTS: Estimated Percentage Increase in Industrial Activity Over 1940



INDUSTRIAL CAPACITY

At the end of World War II U. S. industry found itself with surplus capacity in some lines and serious deficiencies in others. There was more than enough aircraft, machine tool, and synthetic rubber capacity but not nearly enough sheet steel, copper, or electrical machinery capacity to meet pent-up demands.

War experience showed, however, that industrial capacity can be expanded enormously in a few years, given the need and the funds. Thus lack of industrial capacity should not prove a bottleneck to meeting the demands of consumers in the 1950 decade.

A rough estimate places our total investment in industrial facilities (manufacturing, mining, transportation, and distribution) at $200 billion. Just how much capacity industry as a whole, or any given industry, has is impossible to measure.

Capacity is a most elusive concept. In a technical sense, the capacity of an industry is the combined production of all its plants working 24 hours a day, 365 days a year, less an allowance for repairs, breakdowns, and other technical factors. Actual capacity is far less, however. Some facilities are obsolete or high-cost. Supplies of raw materials and components may be insufficient to keep assembly plants running full-steam. Moreover, demand for many products isn't great enough to support round-the-clock production.

PLENTY OF CAPACITY

During the past quarter century, however, experience shows that we have had more than enough overall capacity, and more than enough capacity in almost every industry, to meet all demands. An extensive study showed that even in 1929 only the steel and machine tool industries were definitely operating at capacity.

The growth of productivity as old machines are replaced with new and more efficient ones and as new techniques are developed is one of the main reasons why industrial capacity more than keeps pace with markets. The depression of the 1930's led to a net retirement of about 5% of total manufacturing facilities but manufacturing plants in 1939 could have turned out a quarter more than in 1929 because productivity was a third higher.

Whenever an industry's output begins to approach technical capacity, it becomes profitable to purchase new and more efficient equipment to replace or supplement existing machines so that a certain amount of excess capacity seems to be inevitable in a free enterprise system.

Estimates of the level of industrial production in different lines under conditions of high-level employment during the 1950 decade are shown in the chart. They assume that past trends will continue so that they give only a rough idea of what would happen to output in each industry. Unpredictable shifts of consumer demand or new product developments might cause a big change in the pattern of industrial production. Such estimates are, nevertheless, useful in that they provide a clue to lines where the largest increases may take place.

None of the projected increases are so large as to tax our ability to provide enough capacity. This is not to say that there will be no bottlenecks because of lack of capacity for certain components, for instance. However, we should be able to make good in short order any deficiencies of that sort that may develop.

DEMANDS VERSUS NEEDS

Despite the substantial increase in living standards which would be possible with high-level production and employment in the 1950 decade, many U. S. consumers will be unable to buy enough of life's necessities to maintain themselves at a health and decency level. Almost 30% of all families would receive less than $1,000 a year cash income and one-third of this group would receive less than $500.

The 20th Century Fund asked a series of experts to estimate the quantities of food, clothing, housing, medical care, and other things needed to provide a standard of living at a minimum health and decency level. The experts also figured out how much it would cost to bring everyone expected to be below that standard in 1950 and 1960 up to the calculated level. In other words, the estimates show the cost of establishing a "floor" for consumption without disturbing the spending patterns of those who received more than enough income to satisfy the calculated minimum needs.

ESTIMATES OF NEEDS

Any estimate of "needs" must rest upon someone's opinion as to what constitutes "health and decency" in this day and age. In the case of food, the nutritional requirements of a minimum health and decency standard can be determined accurately. In other fields, such as housing and education, even the experts would disagree over what constitutes a minimum standard.

However, what is important is not the precise size of the estimates but their general magnitudes. The conclusion that we would have to spend about 50% more on medical care than we are likely to in 1950 is important even if the experts' appraisals of the deficit range from as high as 60% to as low as 40%.

To fill total needs calculated in this manner would require production of $200 billion of goods and services in 1950 or 13% more than the $177 billion which would be turned out with high-level production and employment. In 1960, estimated production would fall short of needs by 8%. Food accounts for the biggest share of the deficit but needs outrun demand by important margins in housing, medical care, education, and social security.

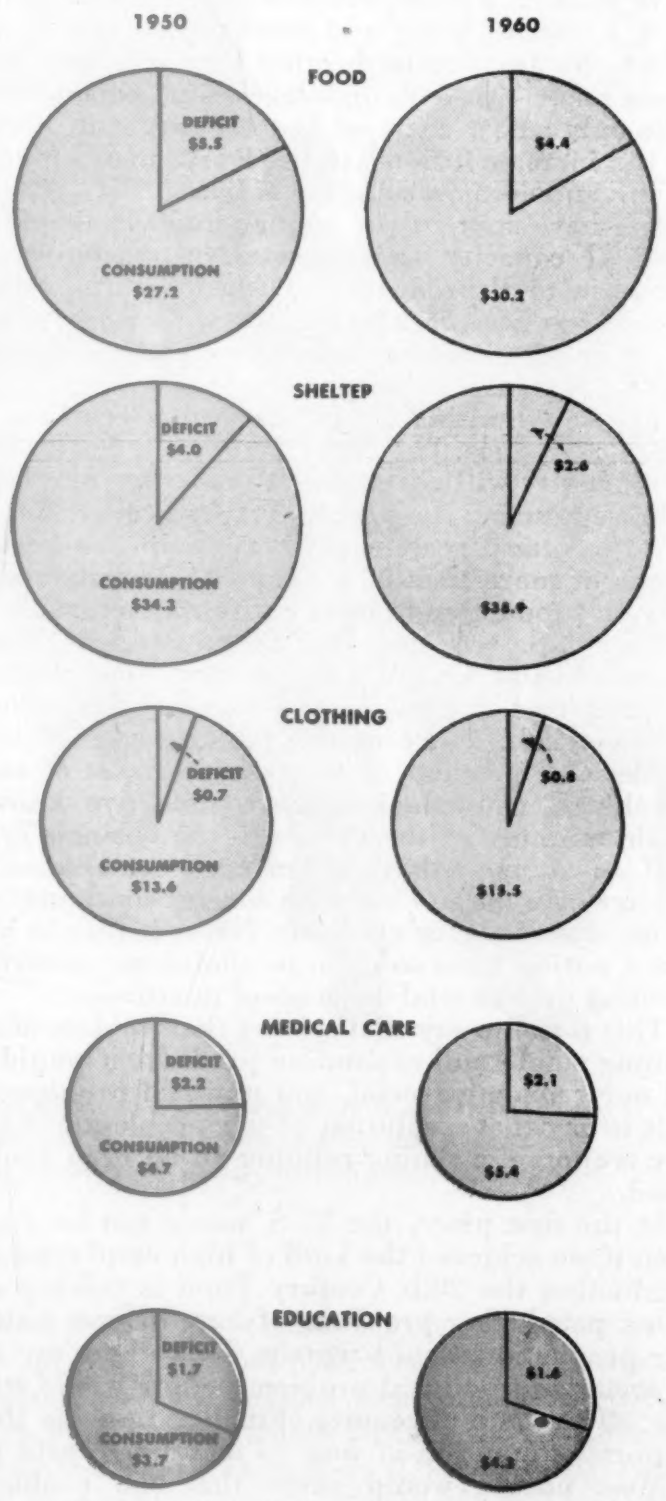
O MEET
LMOST ALL
UR NEEDS

To provide nutritionally adequate moderate-cost meals for those unable to afford them would add $5.5 billion to the $27.2 billion that would actually be spent on food in 1950. This assumes no change in diets of those with adequate incomes despite the fact that many people in those groups do not eat what they should. If we all ate what we needed, we would consume twice as many fresh vegetables as in 1940, half again as much milk, more fruits and tomatoes; and we would eat smaller quantities of sugar, sirups, fats, and oils. This better diet would cost us less than we will actually spend for food in 1950.

So large a portion of our existing housing is unsatisfactory by any reasonable standards that it would take 10-15 years to provide everyone with adequate housing. One of the reasons why we don't have adequate housing is that many consumers cannot afford to pay enough rent to finance it. Estimated expenditures in 1950 for rent (including the estimated rental value of owner-occupied homes) would run to $14 billion as against an estimated need of $16.4 billion.

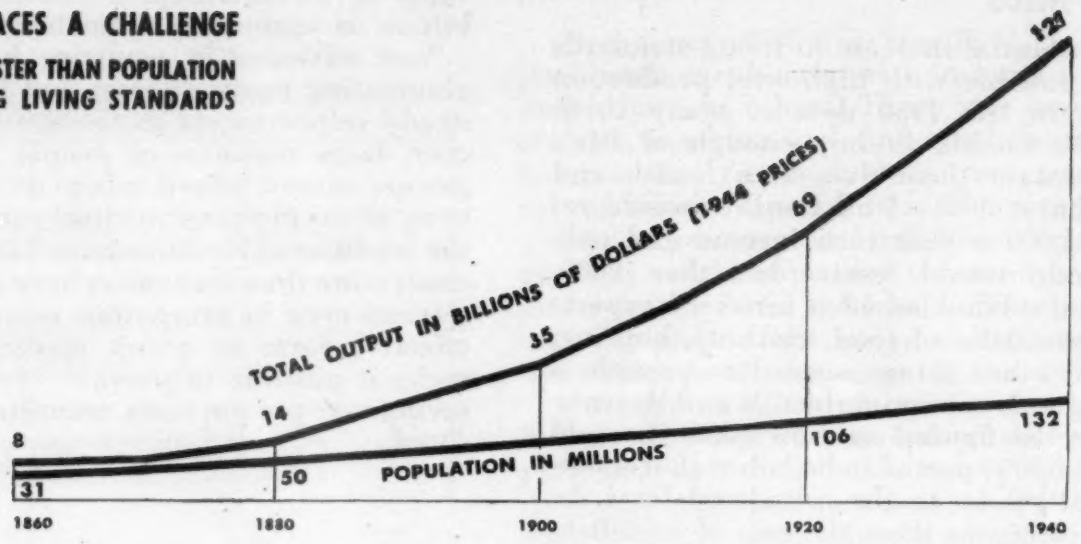
Vast advances in medicine have gone far toward eliminating many diseases and have brought about a steady improvement in the standard of health. However, large numbers of people in the lower income groups cannot afford adequate medical care. Moreover, to supply good medical care for everyone under the traditional fee-for-service basis would cost several times more than consumers have ever spent for medical services even in prosperous years. Development of an effective form of group medicine, however, would make it possible to provide adequate care at a great saving over present costs, according to the 20th Century Fund.

HOW CONSUMPTION WOULD COMPARE WITH TOTAL NEEDS
(Figures in billions of dollars)



THE U. S. ECONOMY FACES A CHALLENGE

PRODUCTION HAS GROWN FASTER THAN POPULATION GIVING PROMISE OF RISING LIVING STANDARDS



The major conclusion of the 20th Century Fund's survey of America's needs and resources is that we have reached a point where we can provide everyone with a decent living and most people with a living which, by any standards other than our own, is positively luxurious. With high-level employment, it would take only a 13% increase in total output in 1950, and an 8% increase in 1960, to lift everyone to a minimum health and decency standard of living.

We have more than enough industrial and agricultural capacity to support that much of an increase in total production. Lack of natural resources should not be a bottleneck, for with world trade on any sort of a reasonable basis we will be able to get all the raw materials we need.

The only limiting factor is the capacity of our labor force to produce. The 20th Century Fund assumes that productivity will advance at the average rate actually achieved during the past 9 decades (18%). But there is no technical reason why we cannot achieve an increase of more than 30%. That would make possible enough production to meet our minimum needs.

The U. S. economy has exhibited two dominant characteristics in the past century. Our productive capacity has expanded at a rate never approached elsewhere. But our economy has also been highly unstable. Our problem is to make the most of our unparalleled technological and productive know-how while minimizing the swings of the business cycle.

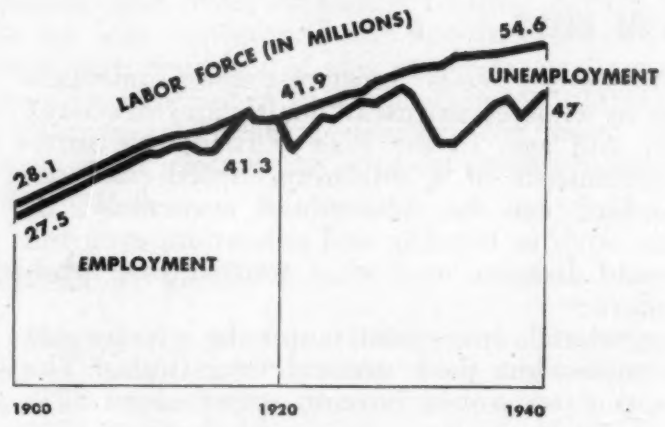
If we can meet that challenge, we can eliminate the specter of want and move on toward constantly rising living standards for everyone. Never before in history has a nation been so close to abolishing poverty and meeting the material demands of its citizens

This is not to say that solving the problem of maintaining stable and expanding production would solve all our economic, social, and political problems. Nor is it to say that a solution of the problem of keeping our economic machine running on an even keel is at hand.

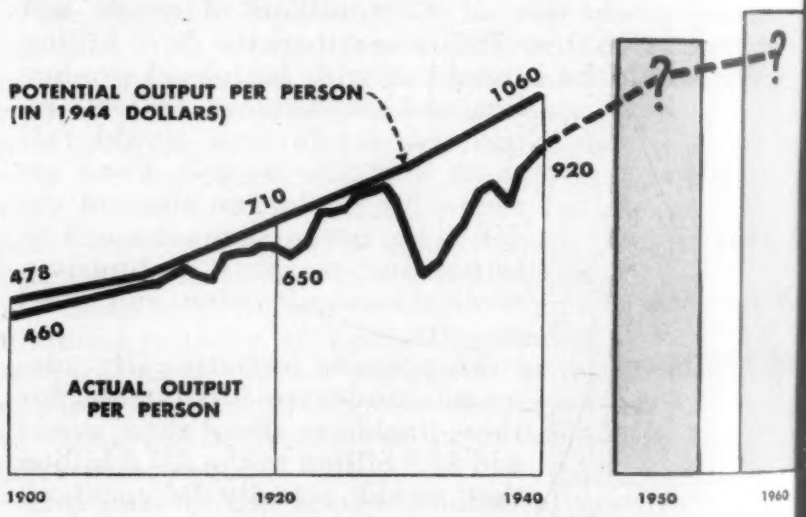
In the first place, the U. S. would not be a utopia even if we achieved the kind of high employment and production the 20th Century Fund is talking about. Many perplexing problems of how to best distribute our production would remain. Then there are a host of social and political problems which would still tax our efforts and ingenuity. Finally, there is the all-important question of how to maintain world peace.

Most people would agree that the problem of maintaining high employment and rising living standards is still far from solution. Our ability to mobilize and direct our economic resources so as to keep our

BUT THE GROWTH HAS FOLLOWED THE BOOM AND BUST ROUTE INVOLVING LONG PERIODS OF MASS UNEMPLOYMENT



CAN THE ECONOMY PROVIDE STEADY EMPLOYMENT AND RISING LIVING STANDARDS?



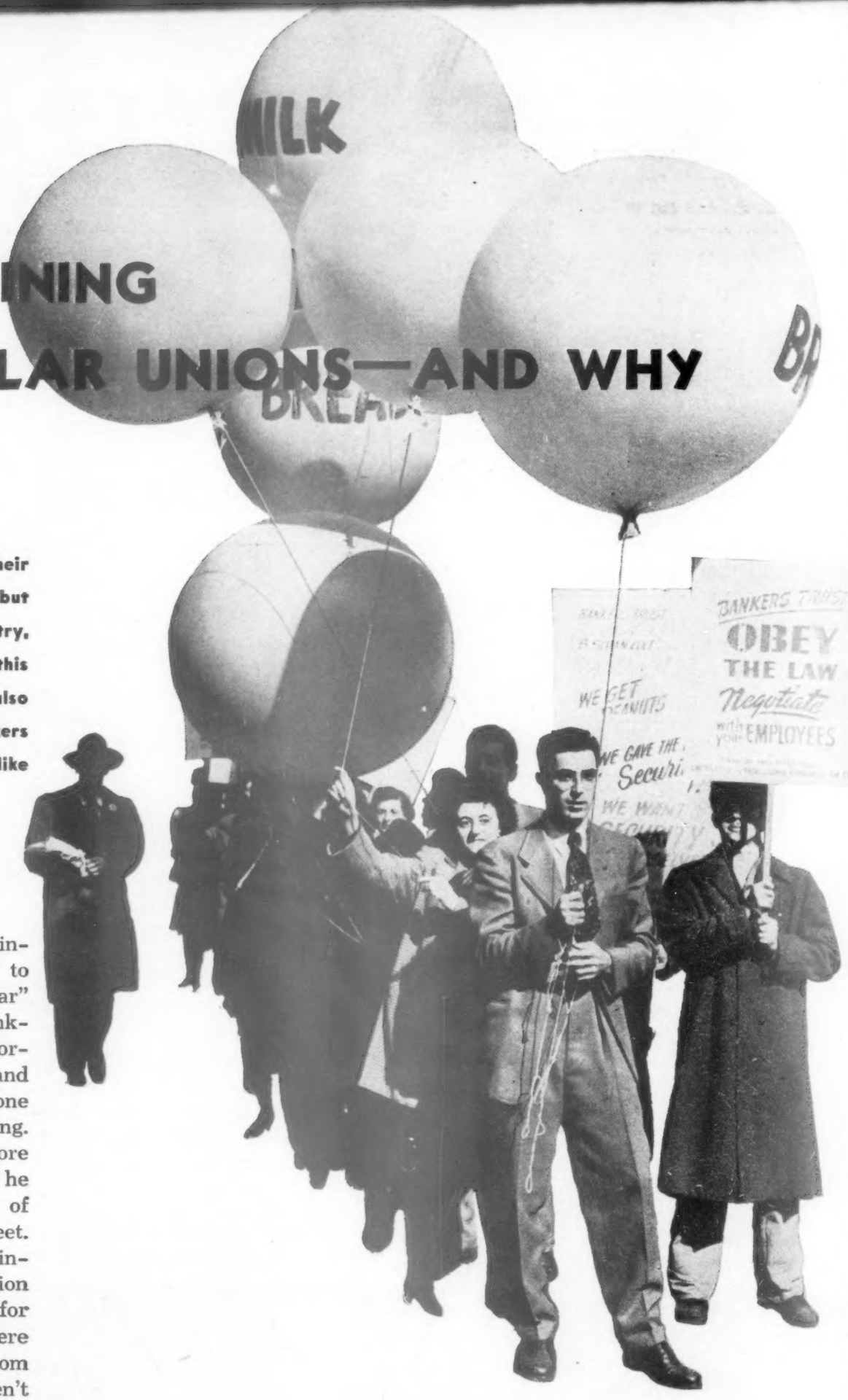
economy running on an even keel has lagged behind our ability to solve technical production problems. Each businessman, each worker, and each consumer must somehow learn to act differently in many ways than he has in the past if we are to solve our number one economic problem.

Just what changes in our economic life will be necessary no one knows. On our ability to find out these things and put them into practice in the next few years depends our success in meeting the challenge which the 20th Century Fund's study underlines. That challenge is that we have within our grasp the ability to eliminate actual want from the U. S. and to provide more and more things for better living for everyone.

Reprints of this report are available at a charge of 25¢ each to cover the cost of handling and mailing. Address orders to Department of Economics, McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York 18, N. Y.

WHO IS JOINING WHITE-COLLAR UNIONS—AND WHY

Office unions are doing most of their shouting today in Wall Street—but they're quietly gaining in industry, expect to move ahead still faster this year. Big rank-and-file unions are also turning toward white-collar workers to boost their membership. Looks like the big drive is coming



Publicity wise and militant, the CIO's United Office and Professional Workers union uses all the tricks to hit headlines and pressure employers. Balloons dramatize rising prices, back up organizing demands

"White-collar workers in industry are the easiest to organize." With the "white-collar" unions—and some of the big rank-and-file unions—scrambling to organize some ten million office and technical workers, this is how one veteran organizer finds the going.

"We are getting more and more banking and insurance workers," he adds. "We are putting a lot of punch right now into Wall Street. But the easy going comes in industrial plants where production workers have been organized for some time. Office workers there see the shop people benefiting from their unions. They feel they haven't been getting their share. *So they come to us.*"

That this organizer and his union are not alone in finding white-collar employees in industry susceptible to unionism is shown in recent reports of gains by the unions. There are no specific figures, but union newspapers are reporting victories in all kinds of industrial operations, including some of the biggest and best-known companies.

It is shown, too, by the drive such unions as the CIO Steelworkers and the AFL Teamsters are putting into organizing office workers. Walter Reuther and his United Auto Workers are beginning a campaign to sign up between 75,000 and 100,000 office employees in the companies where the UAW already has contracts.

How important white-collar workers are to unions today is shown, also, in William Green's unqualified pledge of the support of 7,500,000 members of the American Federation of Labor to its operations in Wall Street. When the local threatened to tie up the stock exchanges, and so virtually shut down

the entire "street," Green promised the AFL would stand with the financial workers "until they win victory."

At the same time, Harry Lundeberg, president of the Seafarers' International Union, made a similar pledge. Lundeberg's extra-tough pickets have bolstered the white-collar workers many times.

CIO's top officers similarly support its white-collar unions and CIO unions have helped promote white-collar organizing.

WHERE WHITE-COLLAR UNIONS STAND

Biggest of the white-collar unions now is the AFL Office Employes' International Union. It has jumped from 47 locals to 205 in three years. Its membership is something over 75,000. OEIU officials say its jurisdiction includes "anyone from the accountant on down in the office." It is strongest in the New York area, but almost 200 of its 205 locals are scattered through the United States. It even has outposts in Alaska and Hawaii.

Working through the United Financial Employes, former independent which affiliated with the OEIU last fall, the union is now driving into Wall Street. Its strategy here is much like the CIO's in first organizing the steel and automobile industries. Once having cracked the biggest and toughest nuts, the union will have a precedent that will make organizing the rest of the field chiefly a "mopping up" operation, its leaders hope.

Without a public relations department to promote it into the headlines, the OEIU feels it is not getting the recognition it should—but nevertheless it makes the news. Its one-day closing of the New York Cotton Exchange, for instance, made front pages across the country.

Exact opposite of the AFL unit in operating methods, union philosophy, and public relations techniques is the CIO's United Office and Professional Workers of America. UOPWA claims 70,000 members, and says about 18,000 of them are in the New York area. It has some 200 locals, 13 of the biggest of which are in New York City. Its major strength is in the big-city areas.

UOPWA covers a broad field. Organized as industrial locals, its units may include everyone from janitors to senior engineers. It, too, wants the Wall Street plums, and is putting more than half its organizing dollars and talent into the fight. But its pickets are also parading at the gates of industrial plants in many parts of the country.

The CIO white-collar unit does a smart selling job with its publicity. Besides newspapers, it has magazines directed at special groups such as technical, social service agency, and insurance workers. Booklets, well written and brightly presented, are aimed at the specific groups UOPWA is recruiting. They are studded with such big names as Albert Einstein and Dr. J. R. Oppenheimer. Its picket-line stunts with pretty girls have been featured in newspapers across the country.

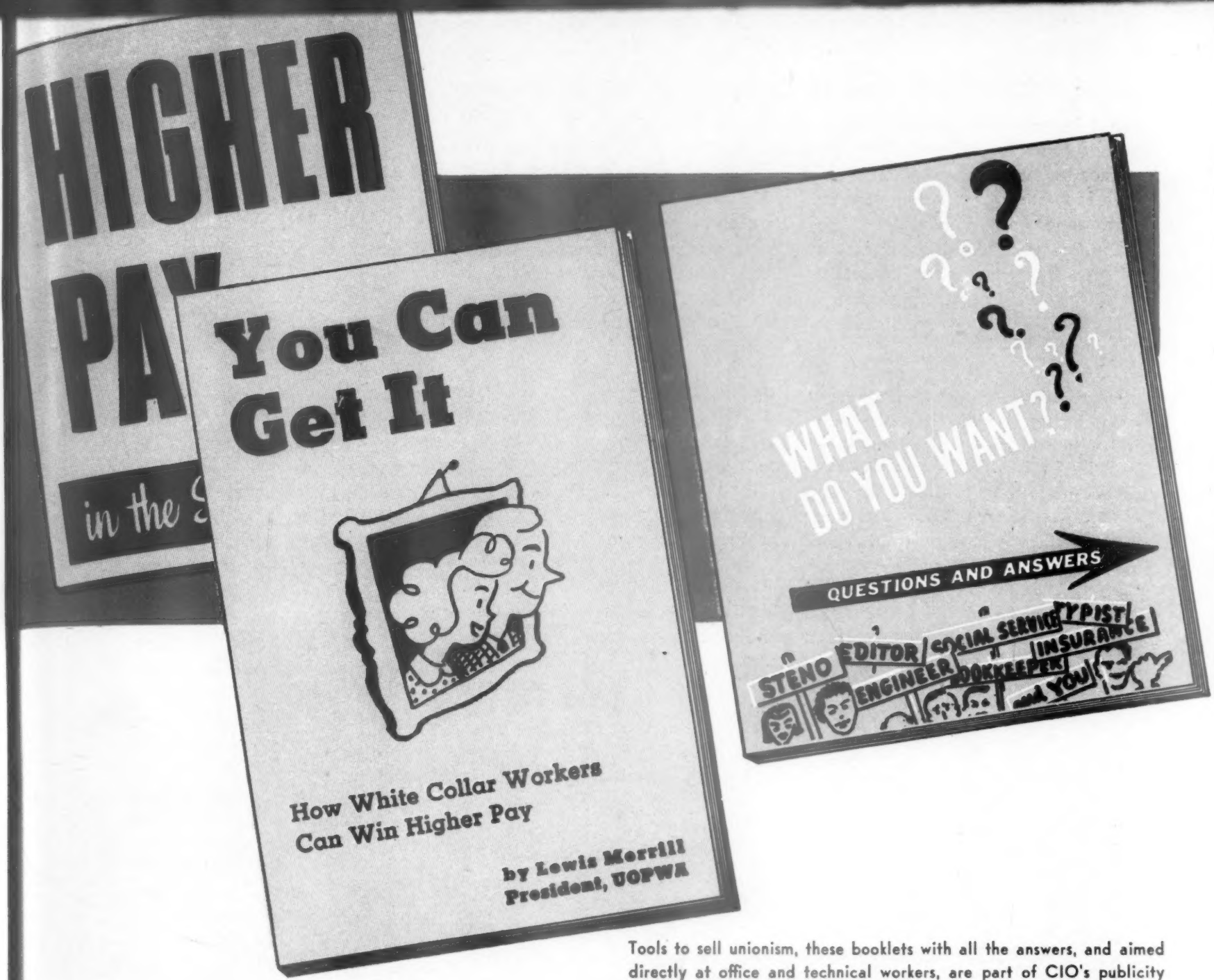
Long regarded as one of the most leftish of the CIO's left-wing unions UOPWA went through a flip-flop last winter. Descriptions of Lewis Merrill, its president, as a Communist by Congressional committees and AFL chieftains hurt recruiting in the Wall Street campaign. In December, Merrill resigned as contributing editor of the Communist magazine, *New Masses*, and as a trustee of the Jefferson School of Social Science. At the same time, the general executive board instructed its locals to adhere to a non-partisan, middle-of-the-road course.

The Communist *Daily Worker* immediately jumped on Merrill for "self-abasement," "appeasement of red-baiting," and "surrender."

In January, the national committee "clarified" the statement. The union, it declared, acted only to resist "employer intimidation, propaganda, and red-baiting." There was no intention to create "a witch-hunt atmosphere."

By mid-March Merrill was again acceptable to the *Daily Worker*. His was one of the "big names" whose pictures and protests against Secretary Schwellenbach's proposal to

Old-line in methods, with all the AFL's traditional toughness, the AFL's Office Employees International Union relies on meetings like this—and smart organizers—to sell unionism. Its rivalry with CIO is keen and bitter



Tools to sell unionism, these booklets with all the answers, and aimed directly at office and technical workers, are part of CIO's publicity barrage. They explain benefits, tell how union is set up and run

outlaw the Communist Party were featured in the *Worker*.

Both CIO and AFL groups claim that only a shortage of money and organizers is holding them back.

Not to be passed over in scouting the white-collar unions are the independents. The National Federation of Salaried Unions, with headquarters in Pittsburgh, claims a membership of 25,000, mostly in the Pittsburgh area. An outgrowth of independent office unions in Westinghouse, it promises completely autonomous local unions free from the domination of "outside strangers." It is capitalizing on the resentment of white-collar workers against "big labor."

Other independents scattered across the country and the rank-and-file unions that have been enrolling office workers may have 100,000 members. Unions among government workers, teachers, and newspaper employees are also booming, have enrolled several hundred thousand members.

HOW WHITE-COLLAR UNIONS WOO

Making hay while the inflationary sun shines, the unions are wooing workers by emphasizing pay gains. Theme of the campaigns is "more money for white collarites caught on the short end of the inflationary spiral." Its appeal is undeniable.

Pay complaints, say the unions, are widespread on the part of salaried workers whose incomes have not gone up as fast as the cost of living has. In many cases, manual workers are now making more than office people.

Demands for greater security are a second key reason behind the white-collar workers' turn to unionism. In addition, organizers say they find almost universal dissatisfaction among office workers on personnel policies. In some companies, "there just aren't any policies. Everything is left to the discretion of the office manager. The fair-haired boy gets what he wants. The others organize and begin looking for someone to represent them before top management."

"We can meet all the beefs in nine cases out of ten with a standard program of pay increases, job classification, and job security," say the organizers.

Philip Murray stressed more money for office workers among the demands he made on the steel industry. Both AFL and CIO are

asking increases in the neighborhood of 25 or 30 per cent.

Office union contracts usually include provision for a union shop or maintenance of membership, job evaluation and classification with pay rates by classification, seniority systems, severance pay, grievance procedures, and automatic increases on promotion. Policies on vacations, overtime, leaves of absence, veterans' rights, insurance and pension plans, sick leave, and working conditions are usually formally agreed upon in black and white.

Representative of many is this announcement of a new contract signed by an AFL union: "Increases ranging from $6.50 to $9 per week, retroactive . . . in addition to a 10 per cent increase paid just prior to a National Labor Relations Board election . . . a 5 per cent Christmas bonus was agreed upon.

"Classification rate ranges were set up . . . a system of automatic increases within the rate range has been adopted.

"A union shop, check-off in dues, a work week of 35 hours and overtime . . . vacations . . . promotional guarantees, grievance machinery and arbitration, and a system of sick leave guaranteeing the first 15 days with full pay in addition to a sick-leave insurance plan."

WHAT'S AHEAD FOR OFFICE UNIONS

With labor observers expecting white-collar unions to sweep the country eventually, top management's reaction to them has been surprisingly mild.

The problems office unions bring with them, for one thing, are much the same as those production workers' unions have been making familiar. Dealing with office workers across the bargaining table is no different from dealing with rank-and-file representatives.

Office negotiators, too, frequently have the education, ambition, and close relationship to management that make dealing with them easy. Many of the techniques they seek, such as job evaluation and classification, are good industrial relations tools already familiar to management. Other ideas, seniority systems, for instance, merely codify practices that have been long-standing in many companies.

Not all has been sweetness and light, though, as the office unions sought recognition or new contracts. The CIO-UOPWA, particularly, has a reputation for militancy in throwing out pickets or calling strikes rather than taking its chances in representation elections. Sympathy walkouts to support the office unions have tied up production in many a company.

In the long run, however, farsighted business managers and organizers in the white-collar unions see their organizations growing to dominate a big part of the union movement. An AFL officer puts it this way:

"Numerically we should be among the biggest of the internationals. There are maybe ten million office workers eligible. If we get anything like a fair share of them, we'll have the biggest outfit in the AFL.

"Then, too, the labor movement is going to need lots of good leadership—new leadership. And we are developing some smart boys now. It's in the cards that they'll swing a lot of weight in union circles ten or twenty years from now."

Before that comes to pass, though, the unions face a big hurdle. Office workers in general have not been union-minded. The great majority of them still don't know the difference between the AFL and CIO. Even although a few individuals from an office get in touch with a union local and others telephone in anonymously, the majority of the workers must be sold unionism. And unions have only started on that job.

Then, too, professional workers often do not like to be thrown into a bargaining unit that includes the office sweepers. Until Congress or the National Labor Relations Board clarifies their status in bargaining units, many top technical and professional workers will hesitate.

But this year will see the white-collar unions push their fronts deeper into industry. Both the CIO and AFL operations in Wall Street are nearing their climax. With that, and the prestige of victories behind them, the two unions will broaden their attack.

And, as the largest single comparatively untapped source of new dues payers, the field looks a lush green to many another union.

"They learn to dance the union way"—CIO white collarites acquire culture along with recreation and relaxation in union-sponsored course. Ballet lessons—and pay increases—are part of the union's self-improvement appeal to workers

LABOR RELATIONS REVIEWED WEEKLY IN COMPANY PAPER

A labor relations column in the employee publication offers one good method for the transmission of current information in the field to workers. And it is one of the methods used by Goodyear Tire & Rubber Company, Akron.

Such a column is a regular feature of the weekly paper, *The Wingfoot Clan,* and always appears in the same spot—first column, page 1. The column was conceived just prior to V-J Day when rumors and misinformation reached their peak concerning labor matters. It was decided that there was definite need to pass along to the workers the straight facts concerning happenings in the field of labor relations. Accordingly the first column appeared August 8, 1945. As an introduction, the aims of the column were stated as follows:

"This column was conceived and instituted in The Clan as a means of supplying information on labor relations of general current interest to all employees. It is not contemplated that it shall ever serve as a medium through which company views and opinions shall be expounded or promoted, but rather that it shall seek to present facts as they are developed and recorded. Those who prepare the column will not intentionally deviate from this policy and, as time goes by, we believe its good faith will be consistently demonstrated and the service to employees will be found worth while."

Reserved seats now on sale ... Aircraft Personnel Office, and ...

Weekly Review
—OF—
Labor Relations

Explore Wage Clause?
Union Nominations
Airfoam Stoppage
5 Grievance Decisions

A meeting to explore the propriety of opening the March 2 wage agreement was indicated last week in a second exchange of letters between the company and the URWA.

Previously, the URWA requested Goodyear and other firms of the "Big Four" rubber companies to negotiate the union's request for a 26c hourly increase. Goodyear refused, denying that the wage question, under terms of the March 2 agreement could be properly opened at this time.

In its second letter the URWA ...ked that the four companies ... union officials No- ... the entire

Another Story About Gun That "Wasn't Loaded"

Here's the first of "emp... gun" stories reported this hu... ing season.

A neighbor boy of Ralph K... ner, Research Laboratory, as... to borrow Ralph's shotgun t... hunting. "Sure," said R... "It's empty—I unloaded it... self the last time I used it.

The boy started out o... house with the gun und... arm. Suddenly, it wen... The buckshot tore a big ... a lace table cloth in the ... room, splintered the ... severed one leg of a ch... ped through a rug, and ... ed off the floor to a b... fore burying itself in ...

Four persons were ... room. Nobody was hu... "We were all badly f... though," Ralph adm... fully.

Beiswenger L... On South Af...

Beiswenger ...

Typical of the column on labor relations that appears weekly in Goodyear's plant paper is this one, which discusses wage clauses, union nominations, grievance decisions

Intraplant News Only

The column deals only with happenings within the Goodyear family during the previous week. No mention is made of labor matters in other industries or even within the rubber industry unless Goodyear is directly concerned. Examples of such exceptions were effects of the coal strike on Goodyear production schedules, and joint wage negotiations of the international rubber union and the "Big Four" rubber companies.

No controversial subjects are discussed except to present the facts, no opinions are expressed, and no editorializing is permitted.

The column is prepared in this manner. Once a week members of the public relations staff meet with factory and personnel officials to review the latest developments in labor relations. Views are freely expressed and quite often opinions are highly divergent until the question at hand has been fully explored and decided. A reporter takes notes, weaves the discussion into column material. To report facts on a work stoppage he often visits the scene and questions foremen and union officials for supplementary information. First draft of the column is submitted to factory and personnel officials for approval.

Throughout its highly successful history the column has conveyed accurate, impartial knowledge on practically every phase of personnel relations. Representative subjects from a long list are contract negotiations, digests of grievance decisions handed down by the umpire, work stoppages, labor needs, turnover trend, correspondence between the company and the union, seniority rights of veterans.

A survey conducted six months after the column started showed a 79 per cent readership among employees. Two Goodyear tire plants, at Gadsden, Ala., and Jackson, Mich., have adopted a labor relations column similar to the one issued in the Akron plants.

35 + 5 = 42½—A NEW WAGE PLAN

RICHARD H. SCOBELL • WORKS MANAGER, GUARDIAN ELECTRIC MANUFACTURING COMPANY, CHICAGO

RESULTS:

1. **Increased production**
2. **Decreased absenteeism**
3. **Bigger take-home pay**

Absenteeism and its handmaiden, high costs, are no longer headaches at Guardian Electric.

When chronic absenteeism made it impossible to increase or even maintain production at a level rate, Guardian invented a new wage plan. Known as the "35 plus 5 equals 42½" formula, it has increased production 8 per cent and reduced unit costs. Actual productive labor hours as related to production volume have dropped 18 per cent. Absenteeism is down 30 per cent.

Installed to keep workers *on the job and producing,* the idea is simple. Although it is based on the standard 8-hour day and 40-hour week, workers are actually paid time and one-half for the hours over 35 worked each week.

Before the plan went into effect last September, there had been a regular weekly loss of direct labor hours. It averaged 16 to 18 per cent. Now workers have to be on the job every hour of every week to gain increased earnings. In the first week the plan was in operation, absenteeism was cut in half. Since then, as employees learned the benefits and realized the cost of missing a half-day by staying at home, the 9 per cent rate has fallen to 4 per cent.

Take-Home Pay Increased

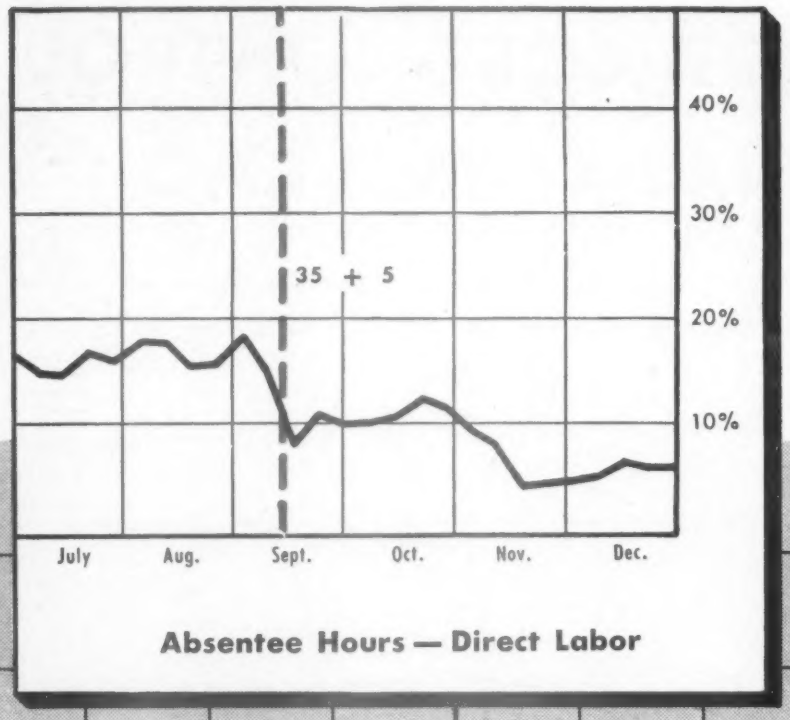
A second purpose of the plan—to increase the take-home pay of workers—was also met. The company hoped that increasing compensation would give workers incentive to produce regularly and efficiently. In theory, the increase would amount to 12½ per cent. Actually, because of normal absenteeism from excusable causes, the net increase has been only about 5 per cent.

Third advantage of the plan is that it will provide greater flexibility in maintaining the organization if business should fall off. In other words, production may be reduced 12½ per cent before it is necessary to lay anyone off.

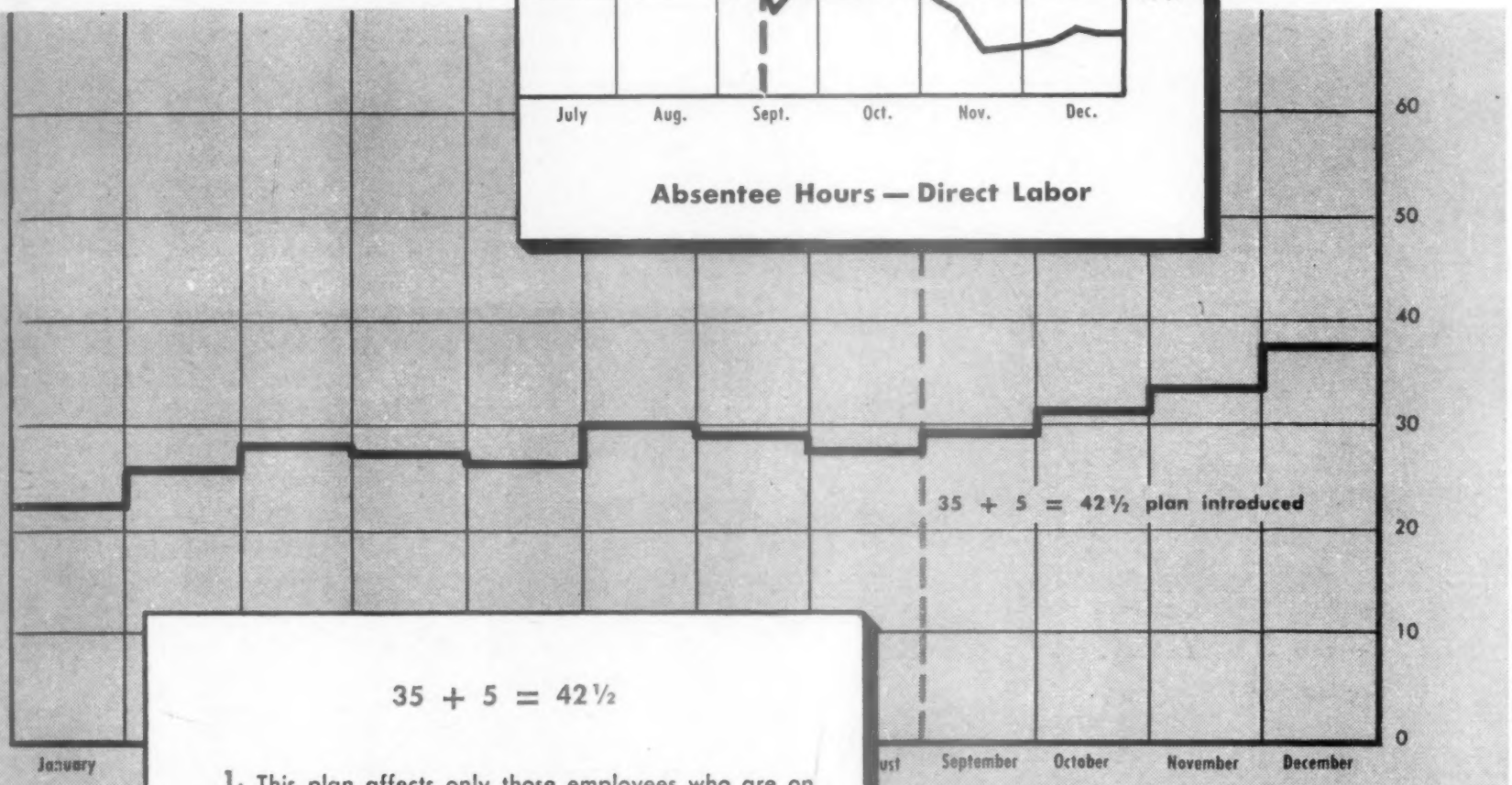
The result—absenteeism is going still lower, productivity is increasing, and unit costs are being reduced. Management and supervisors are free to do their jobs without wasting time over inefficient workers.

The system may not be a panacea for absenteeism, but it seems a potent cure at Guardian. Workers are staying on the job. When they are on the job they are producing. And they are earning more money.

Chart at right shows how installation of the "35+5=42½" plan reduced worker absenteeism. Below can be seen how production increased. At the bottom of the page are a copy of the announcement and one of the posters used to "sell" the plan



Absentee Hours — Direct Labor



Average Daily Production
1946
per Direct Employee

35 + 5 = 42½

1. This plan affects only those employees who are on an hourly base rate of pay, and does not affect salaried employees.

2. You will continue to work 40 hours per week — an 8-hour day — 5 days a week.

3. The starting and quitting times remain the same — the shifts remain the same:
Days — 7:45 a.m. to 3:45 p.m.
Nights — 4:15 p.m. to 12:45 a.m.

4. Your base rate of hourly pay remains the same, but the amount of money you take home will not be the same.

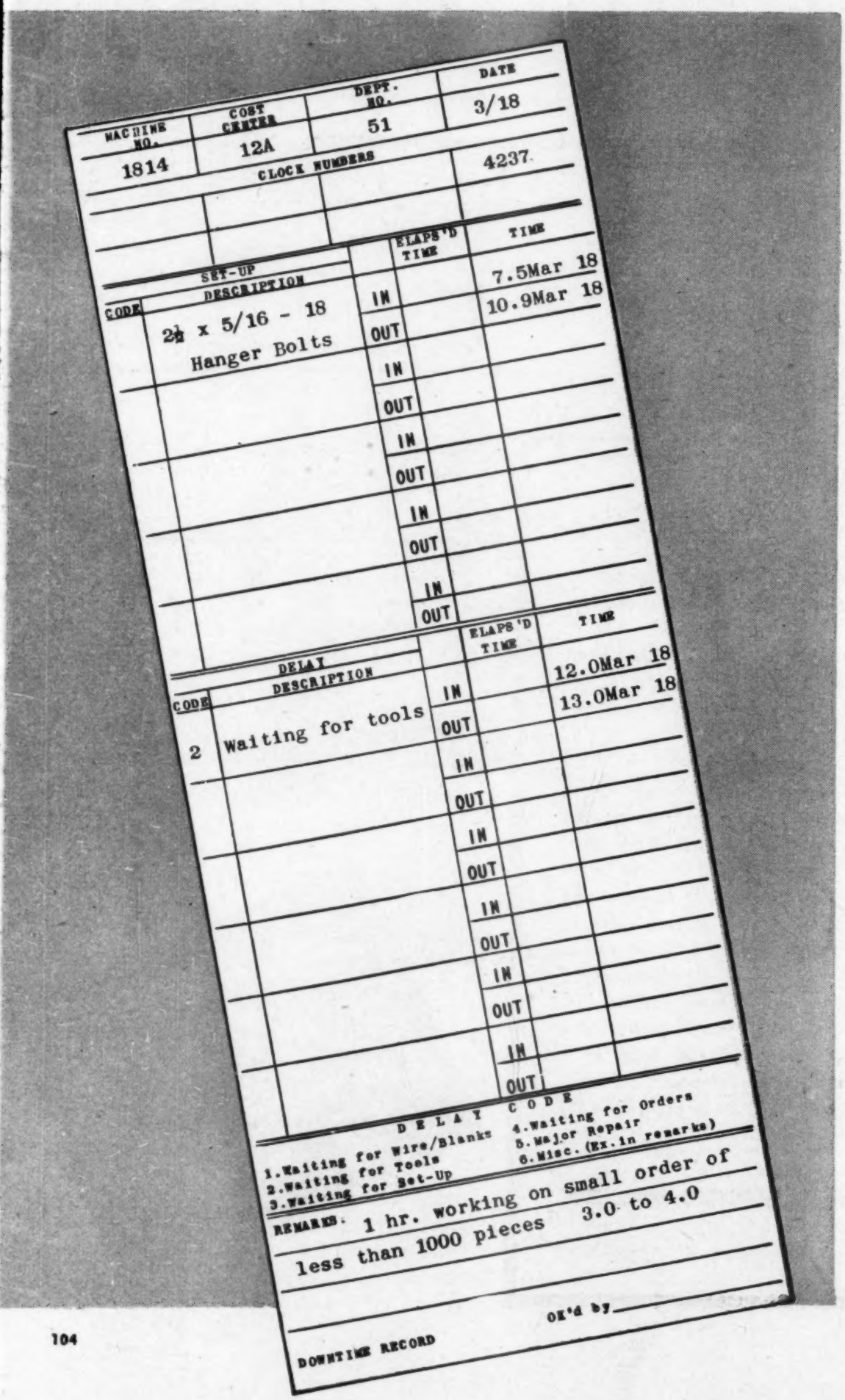
5. Guardian proposes to pay time and one-half for all hours worked over 35 hours — previously it was time and one-half for all hours worked over 40 hours — therefore, if you will work a full 40 hours in a week — 5 hours of that time will be paid at time and one-half — therefore, if you work 40 hours a week, you will actually receive 42½ hours' pay for that 40 hours. In other words, for the last 5 hours of the week, you will receive pay for 7½ hours' work.

6. This plan will become effective September 16, 1946. The increase will appear on your check of September 27, 1946.

GUARDIAN ELECTRIC MFG. CO.

LABOR COST CONTROL WITH MINIMUM TIME LAG

RICHARD D. FELL • MANAGER OF COST ACCOUNTING, NATIONAL SCREW & MANUFACTURING COMPANY, CLEVELAND



MACHINE NO. 1814 | COST CENTER 12A | DEPT. NO. 51 | DATE 3/18

CLOCK NUMBERS 4237

SET-UP

CODE	DESCRIPTION		ELAPS'D TIME	TIME
	2½ x 5/16 - 18 Hanger Bolts	IN		7.5Mar 18
		OUT		10.9Mar 18
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		

DELAY

CODE	DESCRIPTION		ELAPS'D TIME	TIME
2	Waiting for tools	IN		12.0Mar 18
		OUT		13.0Mar 18
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		
		IN		
		OUT		

DELAY CODE

1. Waiting for Wire/Blanks
2. Waiting for Tools
3. Waiting for Set-Up
4. Waiting for Orders
5. Major Repair
6. Misc. (Ex. in remarks)

REMARKS: 1 hr. working on small order of less than 1000 pieces 3.0 to 4.0

O.K'd by _____

DOWNTIME RECORD

Summaries and analyses of all production and operating data are clear, concise, and quickly available at National Screw. All elements of cost, significant ratios, and trends can be seen at a glance on machine-prepared reports.

The manufacturing section is divided into about 200 cost centers, each of which includes all machines in a given department performing a single operation on one size range of product. For example, in the header department, the $\frac{3}{16}$-in. headers constitute one cost center; the $\frac{5}{16}$-in. headers, another.

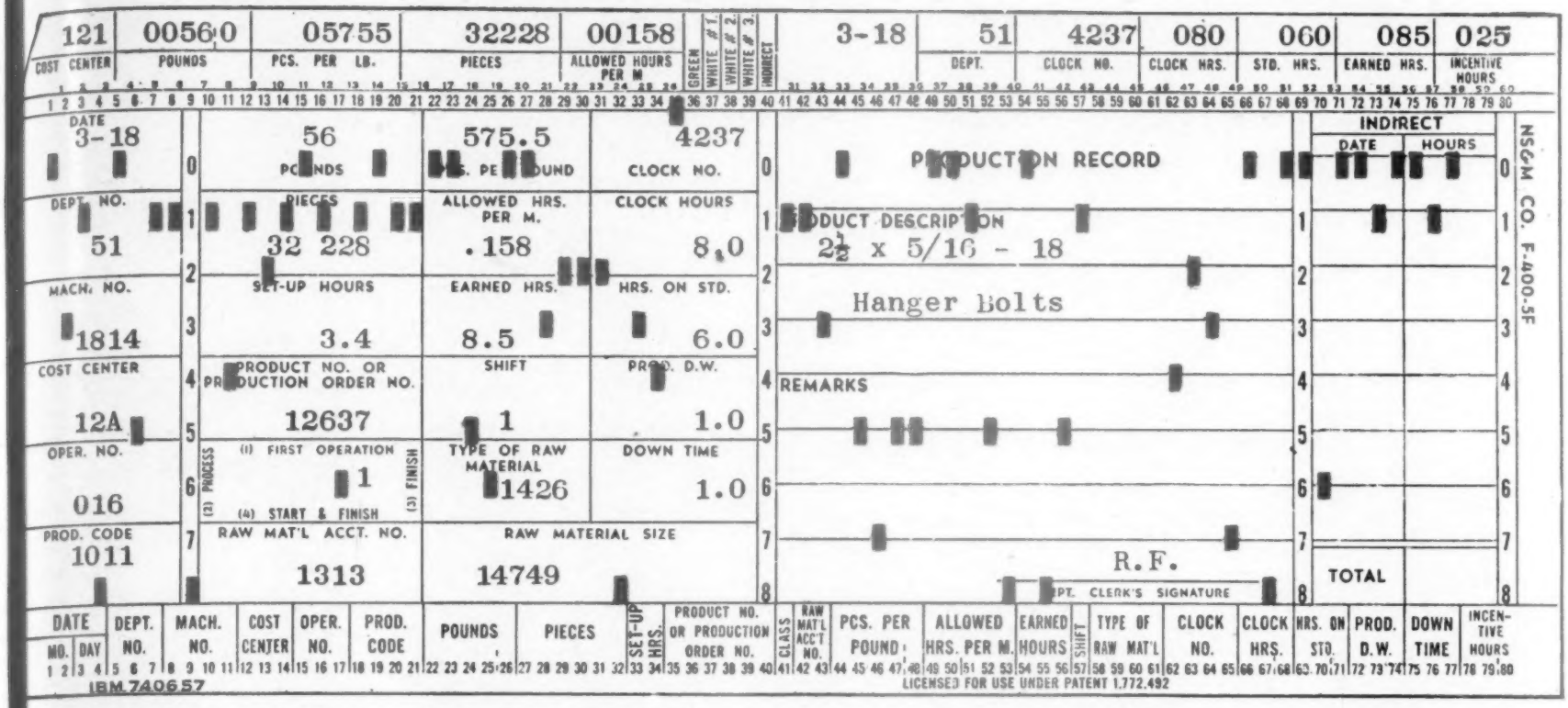
The method used in collecting data to make the necessary reports is outlined below:

1. Employees clock in and out on a time card containing sufficient spaces for a 2-week period. During his shift, the machine operator records on a downtime ticket the actual hours required to set up his machine. Similarly, all delays are clocked in on this card, and the reason for them is noted. In addition, the operator records in the space for "remarks" any time spent on material for which the order is so small that no incentive rate has been developed. "Production" recorded on this card is paid for at day rate.

2. Department foreman approves the time card and the downtime ticket.

3. The production record card is filled out by the weigh clerk when finished material is turned over to him for weighing prior to sending it to the next operation. When com-

Downtime ticket records all work which is to be paid for at the straight day rate. The "Remarks" space is used to list either odd jobs or non-rated work



Production record card is filled out by weigh clerk, who records all production as well as data from downtime ticket and employee's time card. By proper setting of tabulators, all periodic summaries can be produced from this one set of cards

Tabulating machines produce summaries for each cost center. Columns are designated by boldface numbers; where they are not direct weekly totals, the method of computing is shown. For example, column 4 equals column 3 divided by column 2

DEPARTMENTAL PRODUCTION AN HOUR REPORT—WEEKLY

HEADER "A" DEPARTMENT NO. 51

COST CENTER 12 NO. OF MACHINES 9

WEEK ENDING	PRODUCTION M POUNDS	PRODUCTION M PIECES	PIECES PER POUND	PIECES PER MACHINE HOUR	PIECES PER DIRECT LABOR HOUR	HOURS DIRECT LABOR	HOURS ON STANDARD	HOURS EARNED	PERCENTAGE OF TIME ON STANDARD	PERCENTAGE OF EFFCY. WHILE ON STANDARD
*	4.4	2 859	670	6 433	19 056	154	135	188	88	139
* *	4.2	2 584	618	5 922	14 253	182	145	190	80	131
3/3	4.3	2 506	581	6 250	14 656	171	145	186	85	128
3/10	2.3	2 233	962	6 219	12 910	173	133	167	77	126
3/17	3.6	2 834	790	6 121	15 744	180	150	191	83	127
3/24	2.9	1 689	579	5 574	12 894	131	102	122	78	120
1	2	3	4	5	6	7	8	9	10	11
			4=3÷2	5=3÷13	6=3÷7				10=8÷7	11=9÷8

WEEK ENDING	MACHINE HOURS OPERATING	DOWN TIME	LOST TIME	IDLE TIME	AVAILABLE	DIRECT LABOR COST REGULAR	INCENTIVE	NIGHT BONUS	OVERTIME PREMIUM	TOTAL	PER M PCS.	PER MACH. HOUR
*	446	162	65	-	673	139	34	3	23	199	.070	.446
* *	438	167	179	-	784	145	39	4	21	209	.081	.477
3/3	401	151	-	-	552	149	45	4	22	220	.087	.549
3/10	365	147	-	-	512	149	33	4	22	208	.093	.570
3/17	463	185	72	-	720	128	36	4	19	187	.066	.404
3/24	303	153	120	-	576	125	17	3	19	154	.091	.508
12	13	14	15	16	17	18	19	20	21	22	23	24
											23= 3÷22	24= 22÷13

* Average 3rd Quarter

* * Average 4th Quarter

WEEK OF MONTH OF August 19

DEPARTMENT 51

COST STATISTICS

CURRENT MONTH PIECES PER HOUR	CURRENT MONTH COST PER C LBS.	CURRENT MONTH COST PER M PCS.		AVERAGE MONTH – PAST 6 MONTHS PIECES PER HOUR	AVERAGE MONTH – PAST 6 MONTHS COST PER C LBS.	AVERAGE MONTH – PAST 6 MONTHS COST PER M PCS.
5 854	x x x	x x x	Machine (Hours 25 345)	5 714	x x x	x x x
9 776	.575	.114	Direct Labor (Hours 16 276)	9 412	.576	.119
15 353	.305	.060	Indirect Labor (Hours 9 664)	14 132	.310	.065
x x x	.939	.186	Manufacturing Expenses	x x x	.885	.202
x x x	.289	.057	Additional Labor Cost	x x x	.284	.061
x x x	2.108	.417	TOTAL DEPARTMENTAL	x x x	2.055	.447

CURRENT MONTH M PIECES	CURRENT MONTH POUNDS	CURRENT MONTH PCS./LB.	PRODUCTION	AVERAGE MONTH – PAST 6 MONTHS M PIECES	AVERAGE MONTH – PAST 6 MONTHS POUNDS	AVERAGE MONTH – PAST 6 MONTHS PCS./LB.
148 372	2 938 M	50.5		149 860	2 540 M	59.0

CURRENT MONTH ACTUAL COST	CURRENT MONTH VARIANCE	DEPARTMENTAL EXPENSE	YEAR TO DATE ACTUAL COST	YEAR TO DATE VARIANCE
16 886	162	TOTAL DIRECT LABOR – REG.	146 391	1 648
		INDIRECT LABOR – REG.		
-	-	405 Set-up Men	-	-
416	8	406 Washers and Cleaners	3 589	191
799	* 12	407 Cribmen	7 061	46
-	-	408 Machinists	-	-
1 144	* 39	409 Rattlermen	9 343	* 320
2 700	100	410 Supervisors	25 880	235
1 503	* 53	412 Clerks	12 150	* 396
308	* 8	413 Production Schedulers	2 624	82
810	* 25	414 General Laborers	7 663	233
-	-	418 Inspectors	-	-
1 164	30	419 Material Handlers	9 211	196
117	* 117	Night Bonus	1 157	* 1 157
8 965	* 118	TOTAL INDIRECT LABOR – REG.	78 680	* 888
		MANUFACTURING EXPENSES		
652	* 22	26 Material Handling	5 589	* 206
6 030	* 130	27 Inspection	41 004	* 1 082
77	2	32 Processing Material	927	38
636	11	33 General Factory Supplies	8 118	165
5 308	140	64 Maintenance of Equipment	45 630	* 977
11 962	* 198	65 Maintenance of Tools	102 411	* 3 419
2 076	42	66 Small Tools	11 853	4 780
843	65	68 General Maintenance	9 414	* 1 213
27 586	* 92	TOTAL MANUFAC. EXPENSES	224 948	* 1 914
53 438	* 49	TOTAL EXPENSES – BUDGETED	450 019	* 1 154
		ADDITIONAL LABOR COST		
2 997	* 2 997	Direct Labor – Overtime	24 300	* 24 300
2 855	* 305	Direct Labor – Incentive	25 083	* 3 173
1 625	* 1 625	Indirect Labor – Overtime	13 792	* 13 792
1 008	* 124	Indirect Labor – Incentive	9 029	* 1 250
8 486	* 5 052	TOTAL ADDL. LABOR COST	72 204	* 42 516
61 924	* 5 101	TOTAL DEPARTMENTAL EXPENSE	522 223	* 43 670

ACCOUNTING DEPARTMENT – DATE OF ISSUE 9/17

* Unfavorable

OPERATING STATEMENT – DEPARTMENTAL

pletely filled in, this card contains all the information necessary to compute incentive, material usage, inventory, production statements, and payroll. Some of the information on this card cannot be entered directly, and is computed by the bonus clerk as follows:

Downtime. Figures on the downtime time card are converted from machine-hour downtime to man-hour downtime. That is, if one operator tends two machines, the man-hour downtime involved is one-half of the total machine-hour downtime involved.

Productive daywork. Taken directly from the "remarks" section of the operator's downtime ticket.

Hours on standard. Calculated by subtracting man-hour downtime plus productive daywork from total clock hours.

4. After the bonus clerk is finished with the production record card, it is sent to the tabulating room where it is punched and verified, and then fed into a calculating machine which computes:

Pieces produced. Multiply pounds produced by pieces per pound.

Earned hours. Multiply allowed hours per thousand by thousands of pieces produced, add set-up time.

5. Employee's daily incentive report is prepared from the production record cards. Report includes clock number, clock hours, hours on standard, productive daywork, earned hours, and incentive hours. Incentive premium is figured by multiplying base rate by the number of hours on incentive.

6. Weekly machine-hour reports are made out from the information on the downtime tickets.

7. Machine-hour report data are posted to all-department production and hour reports. Subsidiary reports are made weekly by cost center and department.

8. Production record cards are accumulated for one week, sorted by cost centers. Data prepared from them are posted to weekly production and hour reports.

9. Production record cards are re-sorted by employee's clock numbers, and employee earning cards are prepared.

10. "Cost center distribution" of the factory payroll is tabulated from the employees' earning cards.

11. Copies of the weekly summaries (by cost center, by department, and by all departments) are distributed to foremen, executives, and the controller and his staff.

12. The cost accounting department prepares a monthly departmental cost statement for similar distribution.

The machine-hour reports summarize by cost center and by machine the total operating and downtime hours for the week, and show the reasons for the delays. Where it is especially important that machines are productive a large proportion of the time, an analysis may be made for each machine.

Production and hour reports are extremely valuable in pointing out—by comparison with figures on past performance—the success or failure of efforts by cost centers or departments to reduce downtime, set-up time, or other overhead costs. The departmental summary contains two columns of additional information not found in the cost center summary—indirect hours and ratio of indirect to direct labor hours. Increases in this ratio are carefully watched danger signs.

The all-department report enables executives to spot quickly a sudden or gradual increase or decrease in over-all plant efficiency. From this report they can pick out the basic weak point, and can trace it to the department or cost center involved. In like manner, if improvements are noted they can be analysed for possible application to other phases of the business.

Since these reports are compiled and distributed rapidly, they reflect a current condition. Thus it is usually possible to correct adverse trends before much damage is done.

As a further guide to management, the monthly departmental operating cost statement is prepared by totaling the data from the weekly reports, and converting them into dollars and cents. This report contains only those items over which the foreman has a large measure of control—heat, light, and general factory overhead are not included.

A column headed "variance," which does not appear on the other reports, shows the difference between actual and standard or budgeted cost. Since foremen are consulted in the establishment of a budget for their departments, such differences are felt to represent a true measure of their performance. If additional machine capacity is placed in any department, the budget is increased by prorating.

Indirect labor costs are broken down into various classifications so that the foreman will know just where his expenses are heaviest.

Manufacturing Expenses

In like manner, a "manufacturing expenses" section itemizes these different classifications: Inspection and materials handling cost—distributed among the various departments according to the tonnage handled. General factory supplies—furnished on requisition and charged directly to the department. Processing material represents such supplies as oil and grease. General maintenance does not include building maintenance (part of factory overhead), but does include machine maintenance performed by the general maintenance department. Tool maintenance includes the manufacture of new tools, and the refurbishing of old tools. Equipment maintenance includes machine shop repairs (other than electrical) to all machines.

"Additional labor costs" are shown, and represent overtime and incentive for both direct and indirect labor. These constitute a non-budget item, but one which the foremen can improve by eliminating as much downtime as possible.

The most valuable feature of this cost system is that the reports are issued immediately following the close of the accounting period. In this way the foreman can check the source of his variance trouble while the condition still exists.

Monthly summaries are made up for each department. "Variance" columns denote gains or losses compared to budgeted amounts for each item. A quick glance tells top executives where major cost-cutting activity is required

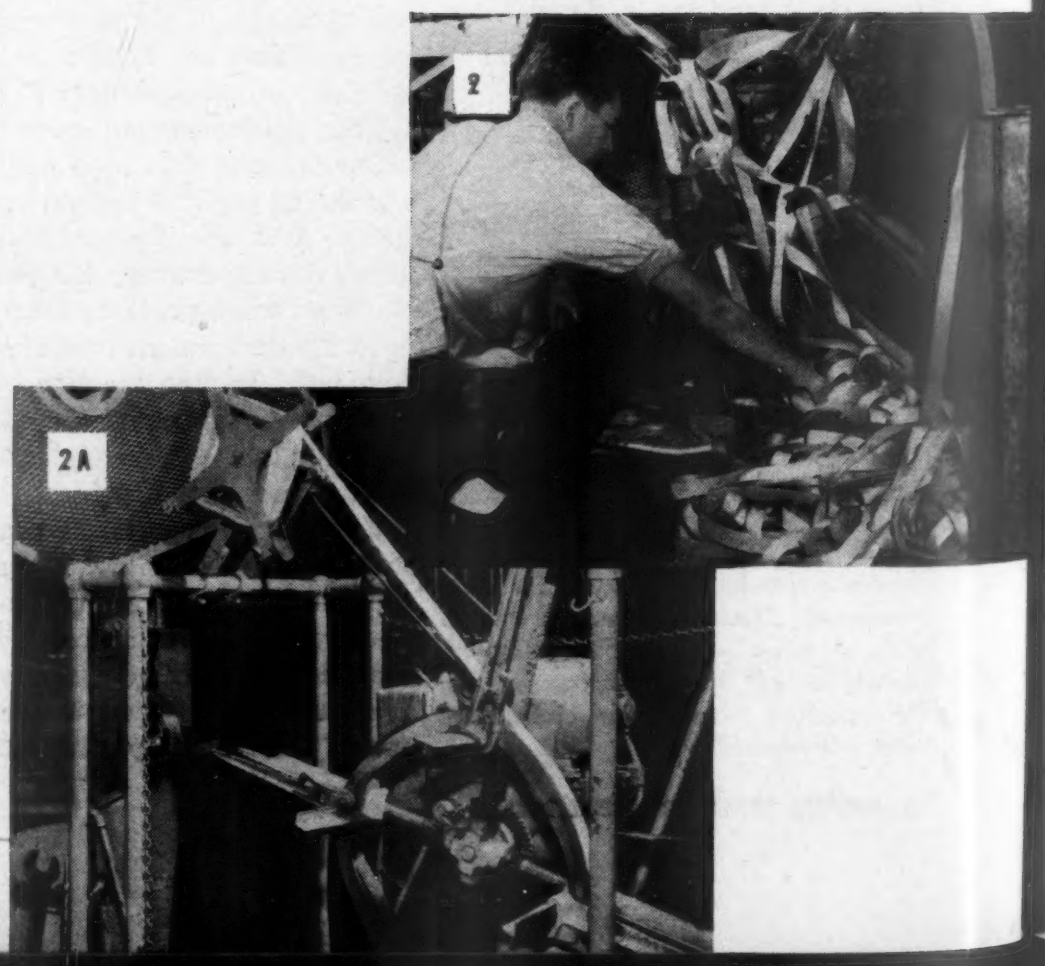
CASES IN WORK SIMPLIFICATION

From the files of Walter A. Hoffman, work simplification supervisor, and Robert Arny, methods department supervisor, at the Harrison, N. J., plant of the RCA Tube Department. Shown on these pages are eight recent methods improvements—some little, some big; some with applications limited to fine assembly work, such as radio tubes; some with almost unlimited applications in industry. Here is proof, if proof were needed, that the training courses in work simplification and the cooperation of the work simplification and methods departments are worth while

1 Innovation with perhaps the broadest possible use is the portable, sheet-metal, workplace layout fixture shown in the picture at the right. Cut to the exact size of the normal assembly workplace, the plate is a standard purchased grille with ¼-in. holes on 1-in. centers. Jigs, fixtures, holders, and brackets are simply bolted to the plate. *The result:* Layouts can be arranged and rearranged easily and quickly. No holes need be drilled in the workbench top. Rapid, unlimited experimentation with proposed layouts is possible. Adjustments for operators with unusually long or short arms are a matter of seconds rather than minutes or even hours. In the photograph, a foreman, a mechanic, and a representative of the methods department have taken one of the plates from a workbench to a convenient desk and are discussing possible new arrangements.

2 This didn't happen all the time, but the photograph (far right) does show what *could* happen any time an operator turned his back to tend another machine in this group of automatic blanking presses. The coiled steel strapping is interleaved with a continuous strip of paper, and as the strap fed into the machine, the paper simply tumbled to the floor. If the operator wasn't on the alert to push the accumulated paper out of the way. . . .

But now the paper is simply

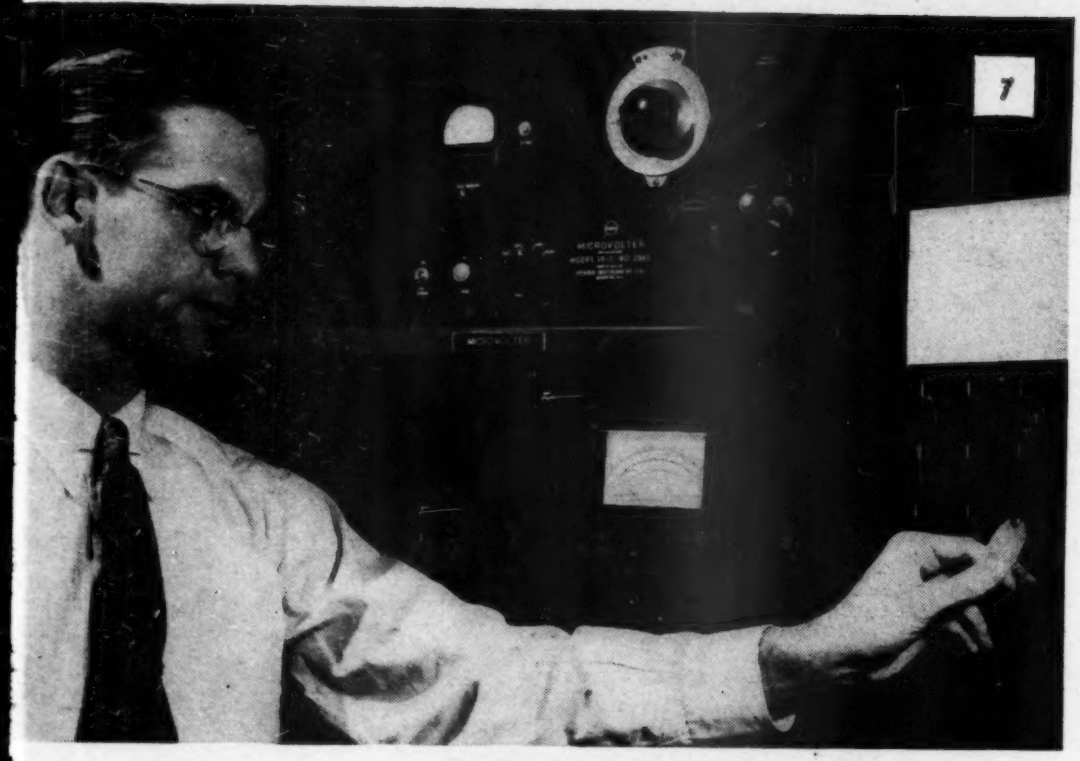


wound onto a belt-driven spindle, out of the way of the machine, and is far easier for the operator to dispose of. No longer is there any downtime for clearing the machine, or any chance for the fouled paper actually to feed into the press, thereby causing serious damage.

3 Take the cartons from the factory skid to the packing table, seal and label them, then take them to the shipping skid. That's how it *was* done, until someone with work simplification training said, "Why not do it in just one operation—by taking the *table* to the *work?*" Result is that the packing table is now mounted on casters. Table is pushed to the open cartons, and, as they are picked up and sealed, they are stacked on the table. When the process is complete, the table is simply rolled to the shipping skid.

4 Electron tube grids are extremely fragile, and, because of their peculiar construction become tangled quite easily when not properly "nested." Picking up one grid at a time from a tray was a delicate and necessarily slow process. The solution was a trough-shaped grid dispenser of sheet metal, mounted at an angle, with two pieces of spring wire at the lower end. The grids, which have a tendency to move downward along the trough, but are held back by the springs, can be pulled out easily and *singly* by the operator. Dispensers are held in clips to facilitate replacement by fully loaded units, and the workplace plate of perforated sheet metal permits them to be placed in any convenient location.

5 Picking up tiny metal parts is greatly simplified by a small magnet imbedded in a rubber finger cap. By dipping her finger into the bin holding the parts, the operator can pick up several minutes' supply. An additional advantage is that this supply can be held near the work, making it unnecessary for the operator to reach to the bin for each part. Although the parts adhere to the magnet in a



"crazy-quilt" pattern, picking out just one at a time is actually simpler than when the parts are in the bin.

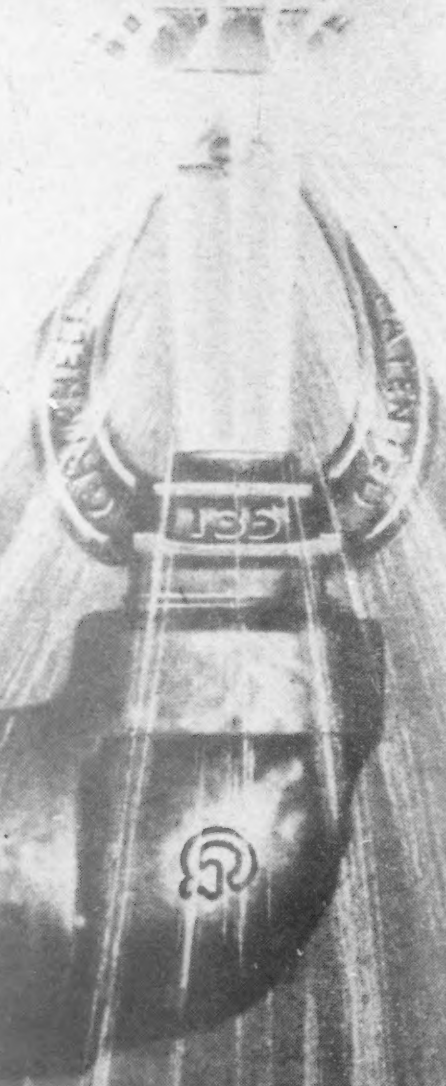
6 Welding filaments to the leads in the tube base is a fine job, and one for which it was difficult to provide adequate illumination because the base plate must necessarily be attached before the weld is made. A small, pocket, "keyhole" flashlight was found to be just right for the job. A clip holds it in place, focuses the light on the tip of the stationary resistance welding electrodes. A special, low-voltage line supplies power for the lights, eliminates frequent battery changes.

7 When someone borrowed a piece of apparatus from the instrument locker in the engineering department, it was sometimes a project in itself for another person to locate the item, especially if it had been removed to another room to be used. Today, when Engineer X borrows an ammeter everyone in the section can know at once that it was *Engineer X and nobody else* who borrowed it. Each piece of equipment has a special place in the cabinet, and that place is labeled with the name of the item. A board on the inside of the locker has been outfitted with a correspondingly labeled hook for each item—and each man in the department has been assigned certain numbered metal key tags. If the tag on the "ammeter hook" is number 7, reference to the legend above the board tells you that X has the ammeter.

8 The clerk in the receiving department formerly spent a good deal of time in an effort to find out who was to receive which package, since the copy of the shipping order carried only the name of the clerk in the order department. Now the order copy also carries the name of the person to whom the package is to be delivered. No longer is it necessary to chase down an order clerk in a remote part of the plant, and for him to pore through back files to determine who gets a given package.

Fire-Fighting Equipment

KINDS AND APPLICATIONS



A. L. BROWN • CHIEF ENGINEER
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BOSTON

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Sprinkler Systems

Automatic sprinklers are by far the most reliable and effective means of fire protection. They go into operation automatically soon after a fire breaks out, each opened head wetting the ceiling above it and deluging an area of approximately 100 square feet with a downpour greater than the heaviest rain. They strike at the seat of the trouble, discharge water just where needed. Operating in heat and smoke, they control inaccessible or unseen fires that could not be reached effectively by other means. Unnecessary water damage is avoided because only those heads open that are needed, and all the water is used to good advantage.

The remarkable effectiveness of automatic sprinklers has been amply demonstrated. In a representative group of the leading plants in the United States and Canada, automatic sprinklers have been the chief factor in reducing the average annual fire damage from 30 cents per $100 of value in 1875, when sprinklers were first introduced, to less than 5 cents today.

For reliable protection, sprinklers are needed wherever there is any appreciable amount of burnable material either in the building or its content. Large-area plank roofs can be effectively protected only by a complete automatic sprinkler system, which should be provided even if the building contents are chiefly non-combustible. Even fireproof buildings need automatic sprinklers to protect burnable contents, and prevent damage to the building. Additions to existing buildings need automatic sprinklers not only for the protection of the new areas, but also to avoid endangering other areas if a serious fire breaks out.

In sprinklered buildings, heads should be located not only to protect the ceiling, but also in closets, under wide benches or sewing tables, in dryers, and in any location shielded from the discharge of the main ceiling sprinklers. Such complete coverage is important because the heat from an unchecked fire in the unprotected area would open many sprinklers beyond, throwing an unnecessary drain on the water supplies, and causing unnecessary water damage.

Essential parts of a sprinkler are a nozzle, a releasing device, and a deflector. The releasing device in most sprinklers is a soldered link element. Another type uses a quartz bulb containing a liquid that expands when heated and bursts the bulb. A third type depends on a low-fusing chemical that liquefies at the rated temperature and allows a strut to collapse.

More than 700 different sprinklers have been made in the past 70 years and of these only 17 are approved and manufactured today.

Temperature ratings should be suited to the location. Recommended ratings are:

Maximum Ceiling Temperature Deg. F.	*Sprinkler Rating Deg. F.*
Up to 100	135 to 165
101 to 150	175 to 212
151 to 225	250 to 286
226 to 300	325 to 360

Heads of too high a rating will be slow to operate. A fire would gain considerable headway and open more heads than needed, causing increased damage both from fire and water. Soldered links on sprinklers of too low a rating may become weakened and operate prematurely. For normal room temperatures up to 100 deg. F., ordinary sprinklers are used. Where higher temperatures are encountered, take thermometer readings under maximum conditions near the ceiling or where the heads are located, and select ratings accordingly.

High-temperature heads are needed near unit heaters, steampipes, in some skylights and monitors, over heat-producing processes, in ovens and dryers, and in similar locations.

Special Sprinkler Heads

Wax-coated heads may be obtained at a slight increase in price, for use where corrosive atmospheres are likely. Lead-coated heads are also obtainable, and are effective under certain mild corrosive conditions.

Sidewall sprinklers have been developed for locations such as executive offices, and other places where the appearance of the usual sprinkler piping is ob-

jectionable. They are installed at the junction of wall and ceiling, and are satisfactory where the hazard is slight. They are not a substitute where a standard sprinkler system is needed, and should be used only on approval of the insurance companies.

Standard Sprinkler Systems

The most common sprinkler system is the wet pipe, wherein the piping is filled with water under pressure that is immediately discharged when the sprinkler head operates, and continues to flow until shut off.

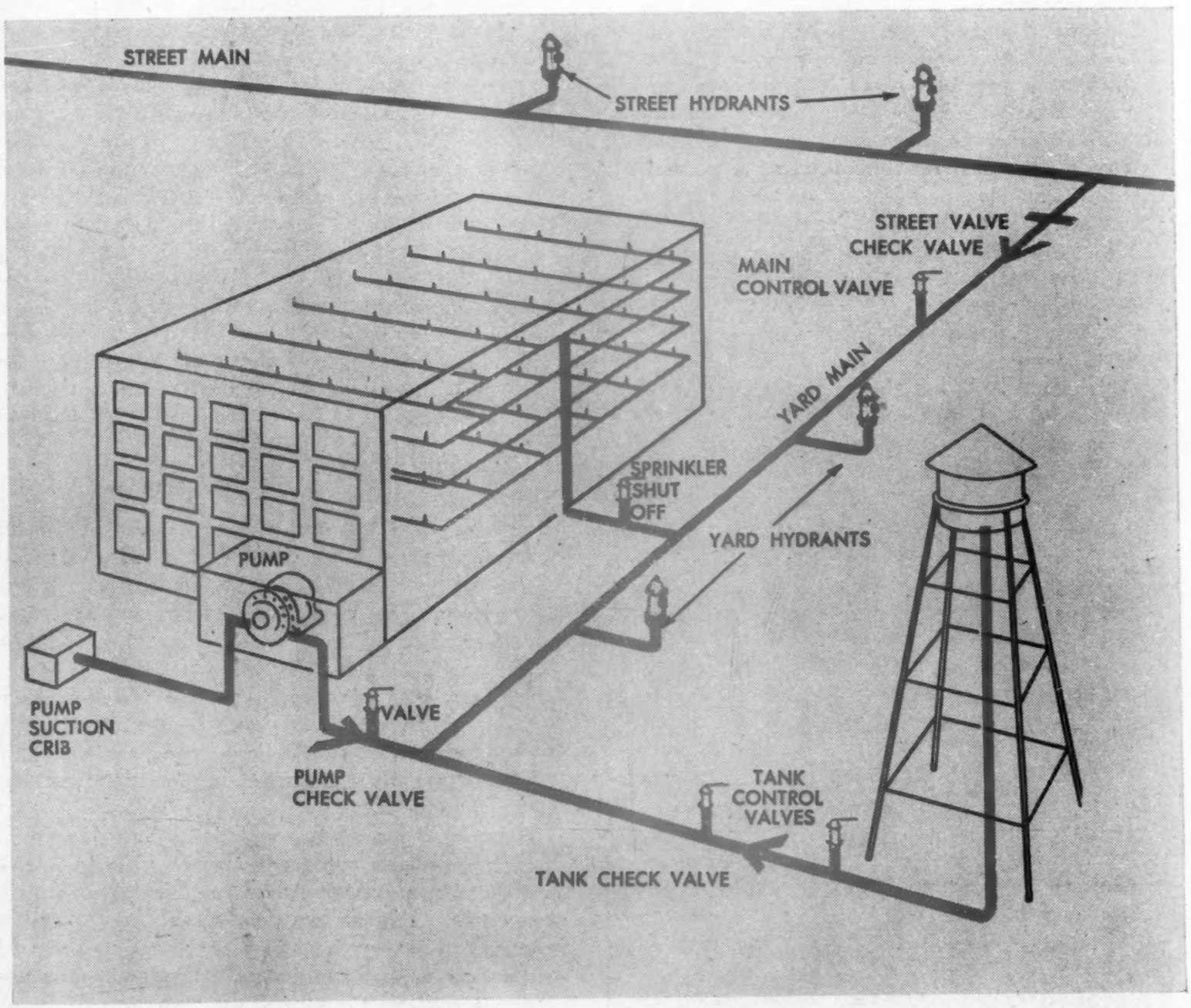
The dry-pipe system is used where buildings are unheated and water in piping would freeze. The piping contains air under pressure, which holds back the water at a dry-pipe valve in a heated location. When a sprinkler operates and releases air, the drop in air pressure automatically trips the dry-pipe valve, and admits water to the system.

Dry-pipe systems are somewhat less efficient than wet systems because of the time needed to release the air. The discharge of air may also accelerate the burning, especially in dust-laden occupancies. To overcome these objections, dry-pipe valves can be equipped with accelerators or exhausters, which rapidly reduce the air pressure when a head opens, so that the system approaches the wet system in efficiency.

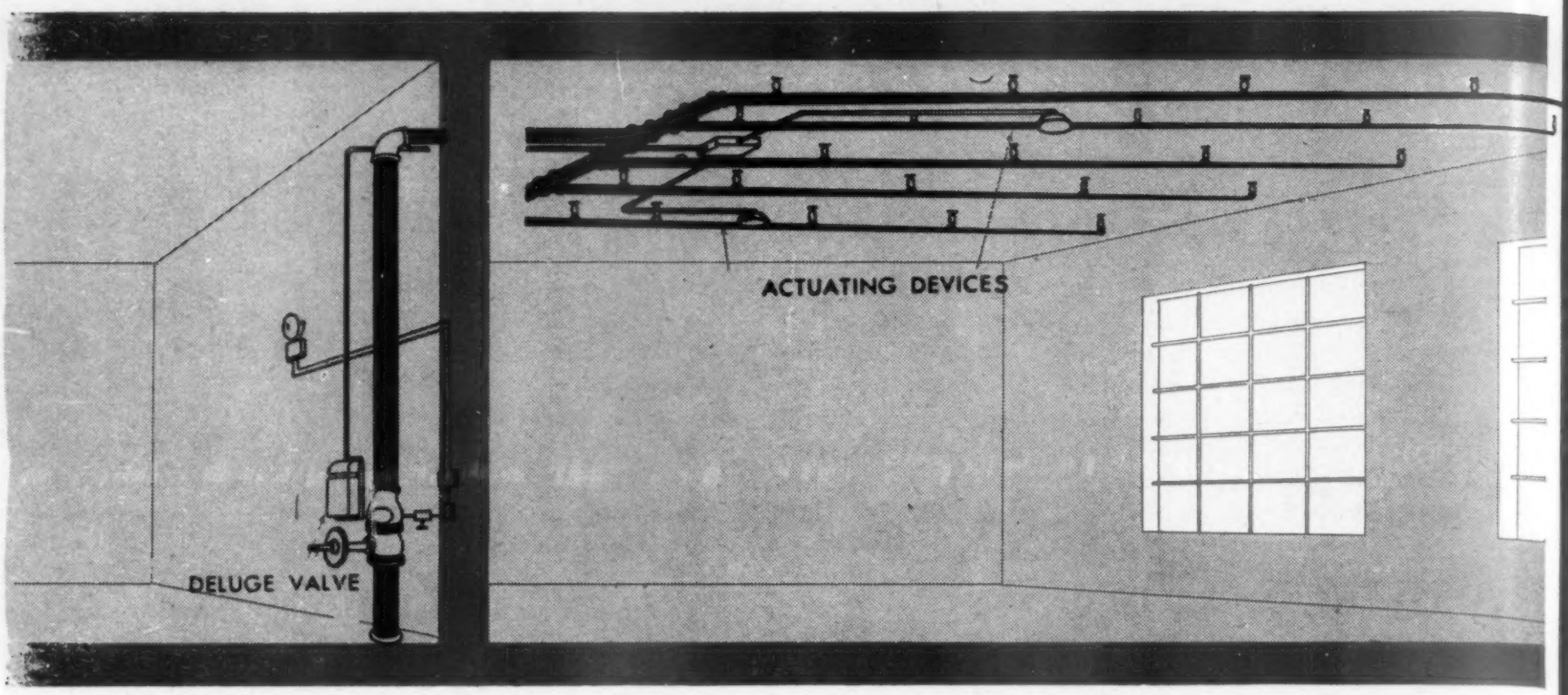
Special Sprinkler Systems

Pre-action dry-pipe systems are available which admit water into the piping after the fire starts, but before the automatic sprinkler heads operate. Piping and heads are arranged as in a standard dry-pipe system. These systems are controlled by heat-actuated devices which cause a control valve to trip and admit water into the sprinkler piping. Thus the system becomes essentially a wet-pipe system just before the sprinklers operate, with the same speed of operation and with the advantage of giving an alarm before sprinklers operate.

The deluge system, another special type, frequently is used in unheated areas or in hazardous occupancies such as airplane hangars, and in storage areas for flammable liquids or other materials, where a flash fire would be likely to open many sprinklers on a standard system. The deluge system has sprinkler heads with the fusible element removed and water is



LAYOUT OF AUTOMATIC SPRINKLERS AND WATER SUPPLIES FOR AN INDUSTRIAL PROPERTY, NOTE CONTROL AND CHECK VALVES



IN A DELUGE SYSTEM, WATER FLOW IS STARTED WHEN THE HEAT-ACTUATED DEVICES TRIP THE DELUGE VALVE

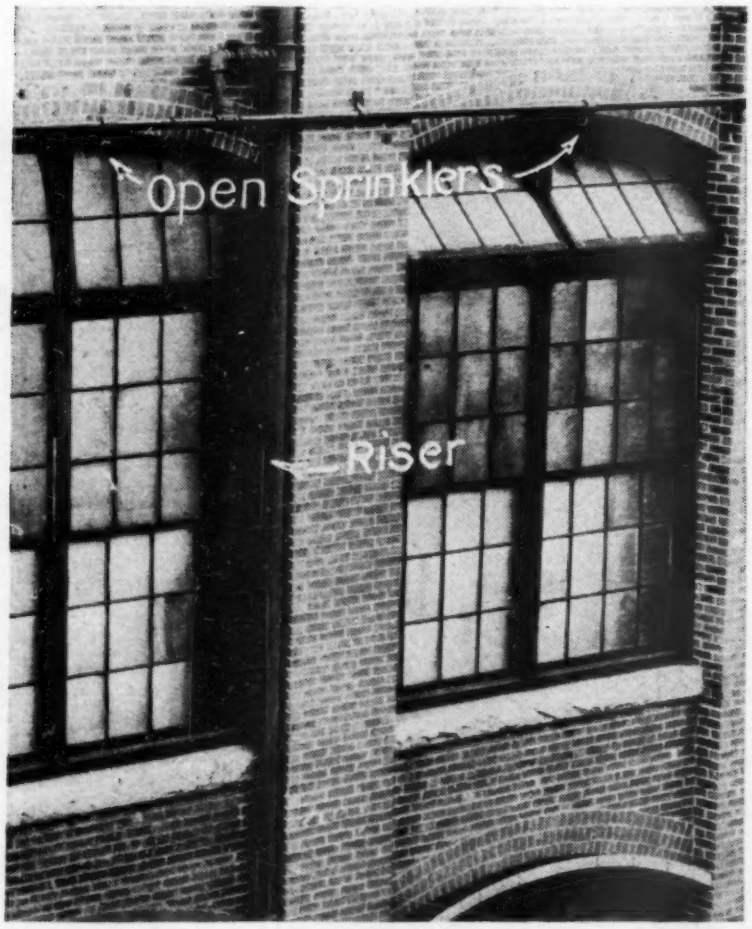
quickly delivered through all the open heads as soon as heat-actuated devices trip a deluge valve.

Non-freeze sprinkler systems are sometimes used in small, relatively unimportant locations where it is impracticable to provide heat. They consist of special piping connections to wet-pipe systems, and have a non-freezing solution in the exposed piping. Glycerine usually is acceptable for this purpose. They are recommended only for systems not exceeding 20 heads.

It is better to provide heat, to connect to existing dry-pipe systems, or to provide small dry-pipe valves. Non-freeze systems are preferable, however, to shutting off the sprinklers and draining the piping during the winter.

Open sprinklers, sometimes known as window and cornice sprinklers, protect windows, doors, and combustible cornices against outside exposing fires. Their use is limited, but effective against moderate exposure. They materially increase the resistance of wired-glass-in-metal-frame windows. Such sprinklers are valuable protection for ducts, cyclone collectors, or outside storage bins.

Operation of these systems depends on the water-supply valve being opened in time, but they can sometimes be adapted to the more desirable automatic control by a thermostatically operated deluge valve, or by other means.



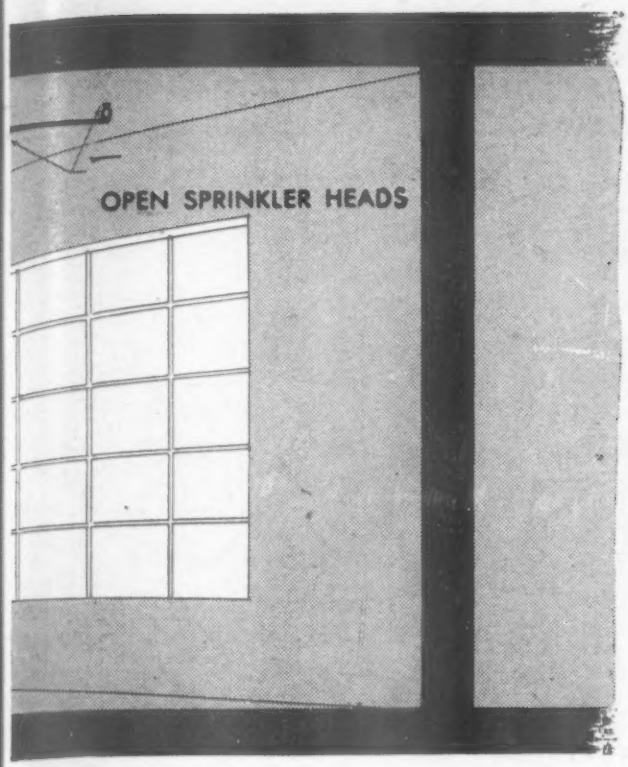
OPEN SPRINKLERS PROTECT BUILDING AGAINST OUTSIDE FIRES

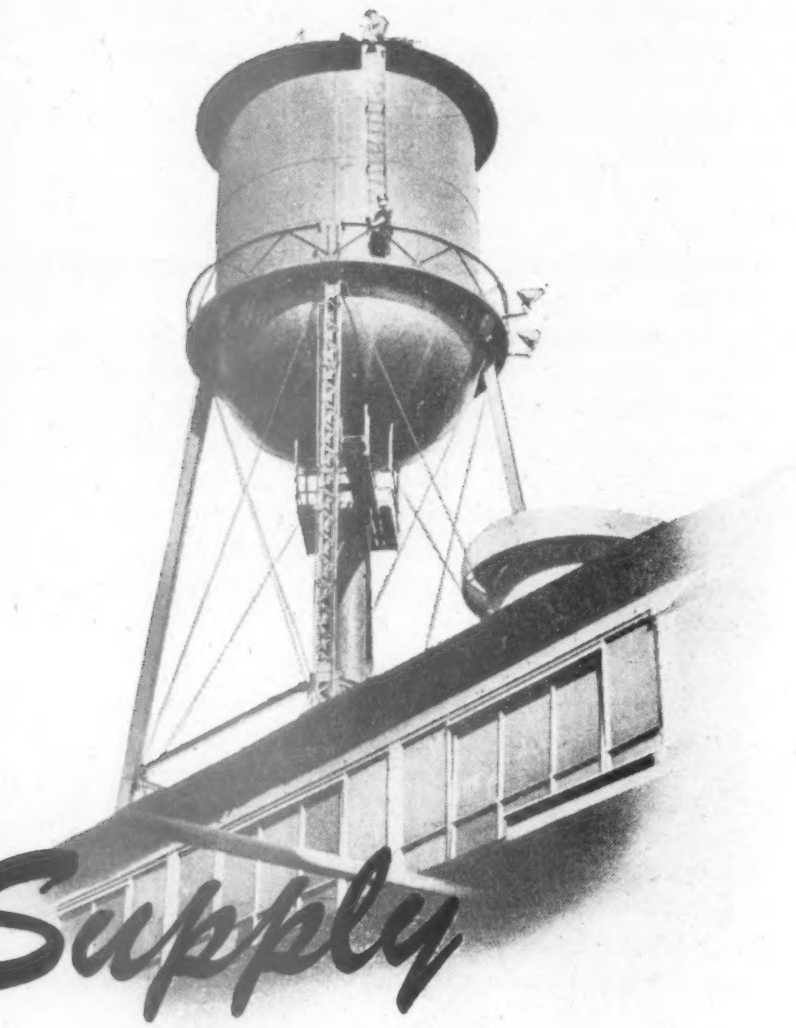
Sprinkler Flow Alarms

Flow of water in a sprinkler system can be utilized to sound an alarm. This desirable feature gives warning both of a fire and of any accidental leakage from the system. The alarm check valve installed in a sprinkler riser can be arranged to ring a hydraulic gong or an electric bell, or both.

Another, less expensive type, the water-flow indicator, is a paddle-like vane projecting into the waterway of the sprinkler piping, with a switch outside which rings an electric gong when the vane is deflected by the flow of water.

Water-flow alarms are especially desirable where building contents are readily susceptible to fire or water damage, and are useful supplements to watchman service. In most industrial centers central station supervisory service is available, whereby alarms for water flow are transmitted to a headquarters office, which in turn calls the fire department and also sends a man to the plant to investigate.





Water Supply

Adequate Water Supplies

Most industrial plants plan their fire protection to be independent of outside assistance. Entire dependence should not be placed on the public fire department. Hence in addition to automatic sprinklers, provision is made for ample yard hydrants and hose equipment, reliable and adequate water supplies, intelligent watchman service, and an organized fire brigade.

Water supplies to automatic sprinklers and yard hydrants must be adequate both in pressure and capacity. Common sources are public water systems, gravity tanks, private gravity reservoirs, or fire pumps taking suction from rivers, ponds, or cisterns.

Two or more independent supplies usually are needed. The exceptions are only where plants are small, of good construction, with comparatively safe occupancies, not dangerously exposed, and located where the public water system is considered strong and dependable.

Of the two supplies, the "primary" automatically maintains pressure on the system at all times. The "secondary" supply supplements it, either automatically or not, as conditions require. The "secondary" supply is available to maintain protection when the primary supply is crippled, or becomes overtaxed or exhausted during a fire. The primary supply should be capable of effectively supplying not less than 500 gallons a minute. For larger properties or where hazards are severe, 1000 to 2000 gallons a minute or more usually are needed. For special hazards, such as airplane hangars, several thousand gallons a minute may be required.

Public Water Supplies

Public water systems are the most common and usually the best primary supply, through one or more connections to street mains of ample size fed by large distribution mains. The fire flow that should be available at the plant depends on the size and height of the buildings, the types of construction, and the nature of the occupancy.

Gravity Tanks And Reservoirs

Gravity tanks are used largely to supplement public water supplies where fire pumps are not feasible, or as a primary supply where a good public water system is not available. Private reservoirs are acceptable either as primary or secondary supplies if of ample

capacity and located at a high elevation. It is essential that the piping leading to the plant be of adequate size to allow ample flow.

Gravity tanks usually are wood or steel, elevated on steel towers or on buildings. The size and height of the tank depend on the amount of storage and the pressure required to satisfy conditions.

The 25,000-gal. tank is used mainly for the protection of small city properties and should be reserved for sprinklers only. The 50,000-, 75,000-, and 100,000-gal. tanks are used on larger properties as primary or secondary supplies of water for the sprinklers and yard hydrants.

The limitations of sprinkler tanks are: (1) The fixed moderate capacity as compared with public mains, and (2) the moderate pressures, particularly for hose streams, as compared with fire pumps. The bottom of sprinkler tanks should be at least 25 feet above the highest sprinklers protecting ordinary occupancies. When tanks supply hydrants, the bottom should be not less than 75 feet, and preferably 100 feet, above yard level.

Fire Pumps

The ideal arrangement of two independent gravity water supplies of ample capacity and pressure is seldom practicable; therefore, a well-located fire pump with ample suction supply and capable of maintaining high pressure over a long period, under most conditions, provides a satisfactory secondary supply. Centrifugal fire pumps of approved design are in common use. Practically all new installations use centrifugal pumps driven by electric motors, gasoline engines, or steam turbines. Of these, the motor-driven centrifugal pump is most desirable because of simplicity of control and operation. Gasoline-engine drives are used to a limited extent where other reliable sources of power are not available.

Adequate suction and reliable power supply are essential for fire pumps. The suction supply ought to be sufficient to operate the pump at rated capacity for at least two hours at the smaller plants, and an inexhaustible suction supply is desirable for good protection of the largest industrial properties.

An automatically controlled, electrically driven centrifugal fire pump is sometimes used as a booster pump when the public water pressure is too low for direct use in sprinkler systems. Most of the fire pumps installed are of 1000-gal.-per-min. capacity.

Fire Department Connections

For properties where the public water supply is at comparatively low pressure but liberal in quantity, or where open bodies of water are available, fire department connections can serve as a most valuable auxiliary supply for pumpers to deliver water into the fire system at high pressures. In city properties particularly, fire department connections are usually a part of the sprinkler systems.

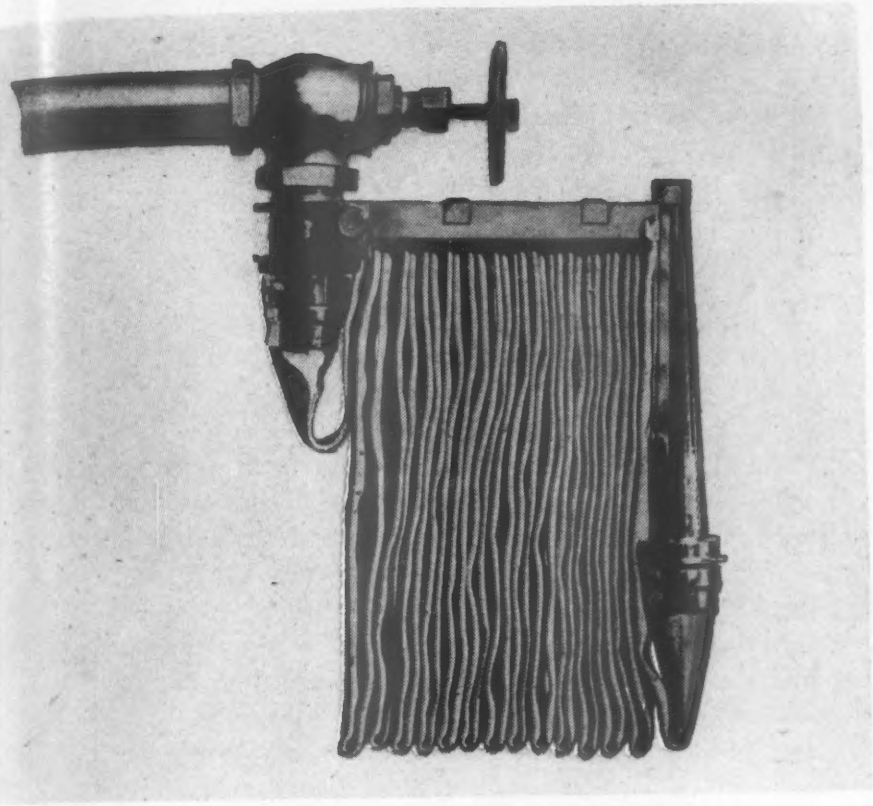
Many public fire departments have definite rules that the first pumper to arrive at a fire should use the fire department connection to supply the sprinklers.

Standpipes and Inside Hose Systems

Next to automatic sprinkler equipment, a well-designed, equipped, and maintained standpipe system furnishes the best means of obtaining effective fire streams in the upper stories of high buildings.

Standpipe systems are designed, (1) for small hose streams used by the occupants, and (2) for large hose streams to be used by public or plant fire departments. Standpipe outlets may be designed to supply both large and small hose.

In buildings of unusual height, standpipes are sometimes supplied by a series of fire pumps and tanks. Standpipes may furnish valuable protection for exposure fires by the use of hose streams through windows and from roof connections.



HOSE IS VALUABLE ADDITION TO INDOOR PROTECTIVE EQUIPMENT

The water supply needed for standpipe systems depends on the size and number of streams likely to be required, and the length of time such streams may have to be operated. At least one fire department connection should be provided for each standpipe riser, although this may not be necessary in strong mill-yard systems.

Yard Piping, Hydrants, Hose

Yard piping to hydrants and sprinkler risers is laid out to deliver sufficient water at any point without undue loss by friction. Hydrants and sprinkler control valves ought to be located a safe distance from buildings, so as not to be inaccessible during a fire. Recommended maximum spacing between hydrants varies from 150 to 200 feet, depending upon the type of building and occupancies. Well-designed hose houses should be erected over some or all the yard hydrants. Recommended equipment for each hose house consists of:

At least 200 feet of approved 2½-in. cotton-rubber-lined hose.

Two approved playpipes.

Four spanners.

One hydrant wrench on hydrant and one spare.

Two ladder straps.

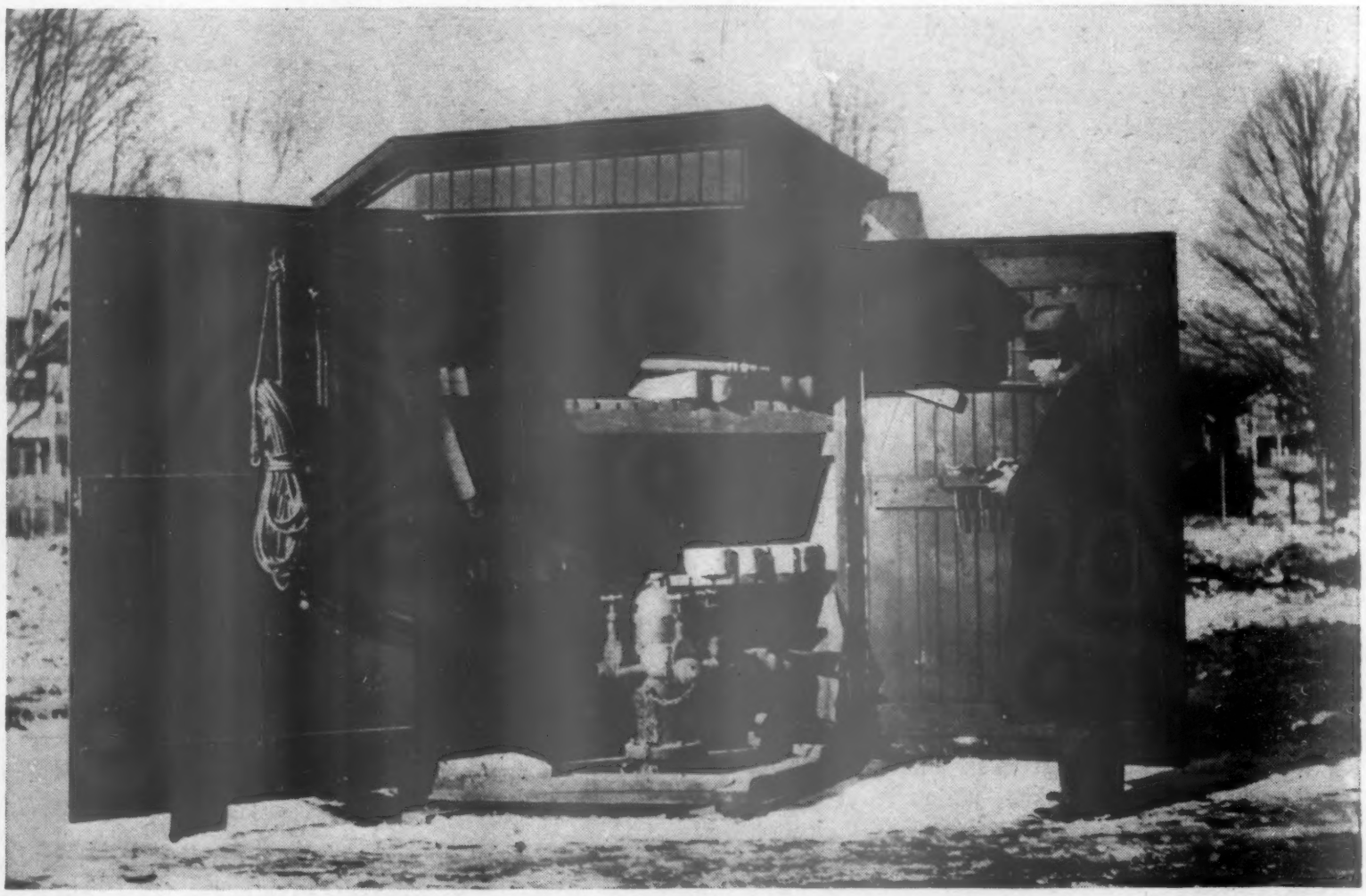
One ax.

One bar.

One playpipe holder.

Spare hose washers.

In large yards one or more hand-drawn hose reels, conveniently located, are desirable, thus enabling



PUTTING HOSE, WRENCHES, AND OTHER EQUIPMENT IN A HOSE HOUSE ERECTED OVER YARD HYDRANTS WILL SAVE PRECIOUS SECONDS

hose and playpipes to be brought quickly to any point. A larger supply can be carried on an engine-driven hose wagon, the use of which is practicable at many plants.

Hose approved for outdoor use is woven of cotton, with a rubber lining, and is 2½ inches in diameter.

Small Hose

Small hose is a valuable addition to the indoor protective equipment in all occupancies. It is especially desirable in rooms having relatively large amounts of quick-burning combustible materials. The long-established standard is 1½-in. unlined linen hose with ⅜- or ½-in. conventional nozzles. Cotton-rubber-lined hose of the same diameter is found to an increasing extent.

Connections should be made preferably to standpipe systems or large mill-use service piping, so that streams will be available when sprinklers are shut off after a fire, or during sprinkler repairs or changes. Connections also may be made from sprinkler piping not less than 2½ inches in diameter on wet systems.

The great advantage of standard small hose compared to other hand extinguishing methods is that in addition to being readily available, it gives a continuing strong stream that can be used with excellent effect on practically all fires except those involving electrical equipment and flammable liquids.

Portable Spray Nozzles

Various types of spray nozzles are available for use both with small and large hose. Some are adjustable to give either a solid stream or a spray discharge. Others deliver spray only, which may vary from a fine fog to fairly coarse droplets. This general type of nozzle is useful in fighting fires in or near combustible fibers or dusts, where a solid stream may blow burning material around. Portable nozzles are also useful for fires in flammable liquids, although the larger tanks should be equipped with permanently piped spray systems, depending upon the type of hazardous liquid involved.

Some types of these nozzles also are safe to use on live electrical equipment, but it is always preferable to shut off the current if possible before beginning to fight such fires.

Extinguishers

Extinguishers Invaluable

Hand-operated extinguishers and small hose are effective when employees are on hand to attack fires immediately after discovery, and frequently are used to put out the final vestiges of fires that have been controlled by automatic sprinklers.

Water Pails and Pump Tanks

The common water pail is the time-honored, original hand extinguisher which is still used to good advantage in many locations. Water pails are suitable for fires in ordinary combustibles, such as wood, paper, or textiles, but not for fires in electrical equipment or flammable liquid tanks. Water from a fire pail cannot be thrown as far or as accurately as a stream can be directed, and cannot be used effectively on overhead fires.

Water barrels provide a quickly available reserve supply for fire pails, and are used principally in warehouses, freight sheds, shipping platforms, and buildings under construction.

Pump tanks are essentially water pails with a

PROPORTIONS OF CALCIUM CHLORIDE FOR NON-FREEZING SOLUTIONS

(Pounds per gallon)

Freezing Point	75% $CaCl_2$	80% $CaCl_2$	98% $CaCl_2$
0 deg. F.	2.64	2.48	2.02
—10	3.07	2.88	2.35
—20	3.44	3.23	2.64
—30	3.78	3.55	2.89

hand-operated pump that discharges through a short length of hose. The operator pumps with one hand and directs the stream with the other. Two men can work more effectively, one pumping while the other directs the stream, which can be thrown 35 to 40 feet.

Sizes available are 2½ and 5 gallons. Compared to water pails, the stream provides better control, has greater range, and is more effective in controlling overhead fires.

To prevent freezing, fire pails, pump tanks, and water barrels can be filled with a solution of calcium chloride $CaCl_2$. Three commercial grades are available, one containing 75 per cent $CaCl_2$, the 80 per cent Flake grade, both readily soluble in water at ordinary temperatures, and the 98 per cent Fused variety, soluble in hot water. The table shows the amounts of calcium chloride required per gallon of solution, for different temperatures.

Chemical Extinguishers

Chemical extinguishers are of many types, all effective when used properly on the kinds of fires for which they are intended. More than 40 per cent of the fires reported to the Factory Mutual Companies in sprinklered areas are put out by extinguishers before sprinklers open, and there are countless other fires so promptly extinguished with such little damage that they are not reported

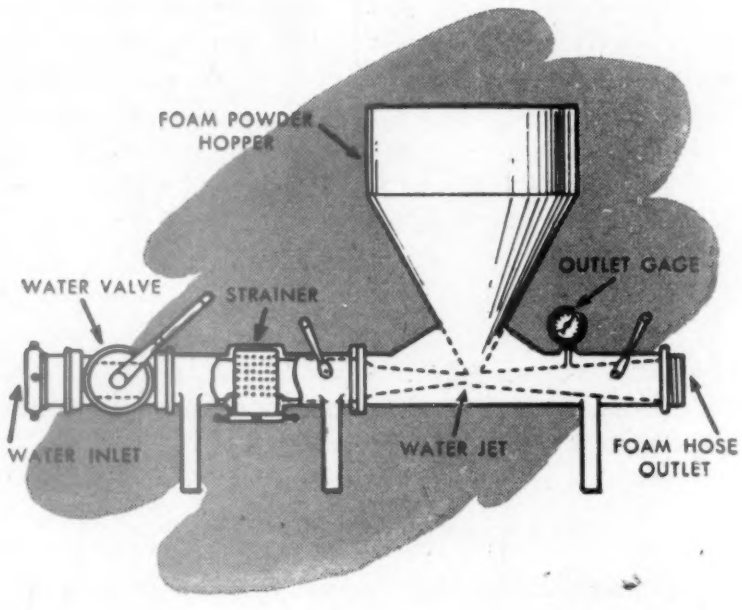
Foam Generators

Foam generators of both the chemical and air-foam types are used where it is desirable to have large quantities of foam continuously, as for the protection of large open flammable liquid containers or storage tanks.

Portable air-foam generators consist of a special playpipe to be attached to a cotton-rubber-lined hose, either 1¼ inch or 2½ inch, and a pick-up tube that is placed in a container of foam liquid, and through which the liquid is drawn into the playpipe by the flow of water. Instead of the pick-up tube and container carried by the operator, a proportioner can be used at a remote point in the water supply line.

In large air-foam generators, a foam liquid is introduced into a water system by a proportioning device and the resulting mixture is piped to a foam-maker or playpipe where air is aspirated and foam produced.

Chemical foam generators employ a powder placed in a hopper and drawn into a stream of water passing through the generator. One type uses a single powder and produces foam in the hose line or pipe at the generator outlet. This type is generally used for tanks



up to 60 feet in diameter, with the generator within 400 feet of the tank. Another type uses two powders, each fed into separate hoppers, the solutions being discharged through separate outlets. Foam is produced at the point where the two hose lines or pipes are brought together. This type is used for tanks over 60 feet in diameter, or where the generator must be located more than 400 feet from the tank.

A special foam powder is used for fires in alcohols, ethers, and esters, which dissolve ordinary chemical foam. Air foam is not effective on this class of liquids.

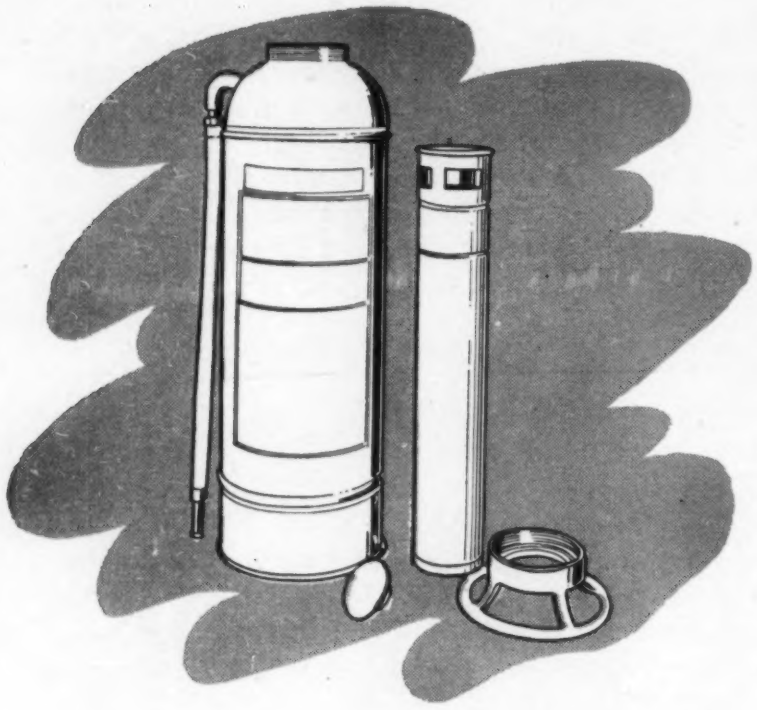
Foam Extinguishers

Foam extinguishers are especially effective for fires in flammable liquids such as oil and gasoline. The action depends on the blanketing effect of the foam, which floats on the surface of the burning liquid. Generally, 1 gallon of extinguisher capacity should be provided for each 2 square feet of liquid surface, which gives a total volume equivalent to a blanket 6 inches deep.

Fire extinguishing foam is of two types: (1) Chemical foam, produced by the mixture of two chemical solutions, and (2) air-foam, produced by aspirating air into a mixture of foam liquid and water.

Portable chemical foam extinguishers are available

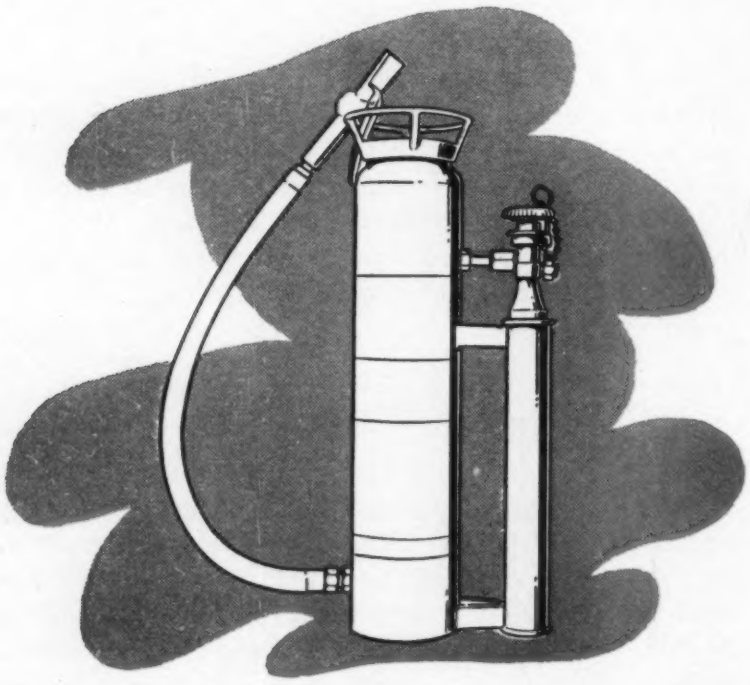
principally in the common 2½-gal. size and in 10-, 20-, and 38-gal. wheeled units. In appearance the extinguishers are similar to the soda-acid types. Each consists of an outer shell and an inner container; on



inverting, the two solutions mix to produce foam, and the charge is expelled by the pressure of carbon dioxide formed by the reaction.

Dry Chemical Extinguishers

Dry chemical extinguishers contain a powder, especially treated to prevent caking, that is discharged by puncturing a cartridge containing carbon



dioxide or nitrogen, the pressure of which forces out the chemical when the nozzle at the end of a short hose is opened. The 15-, 20-, 25-, and 30-lb. sizes have an effective range of 10 to 12 feet. The 140- and 300-lb. extinguishers discharge through a longer hose and an adjustable nozzle which produces either a straight stream of 35- to 45-ft. range, or a fan-shaped stream with a 15-ft. range.

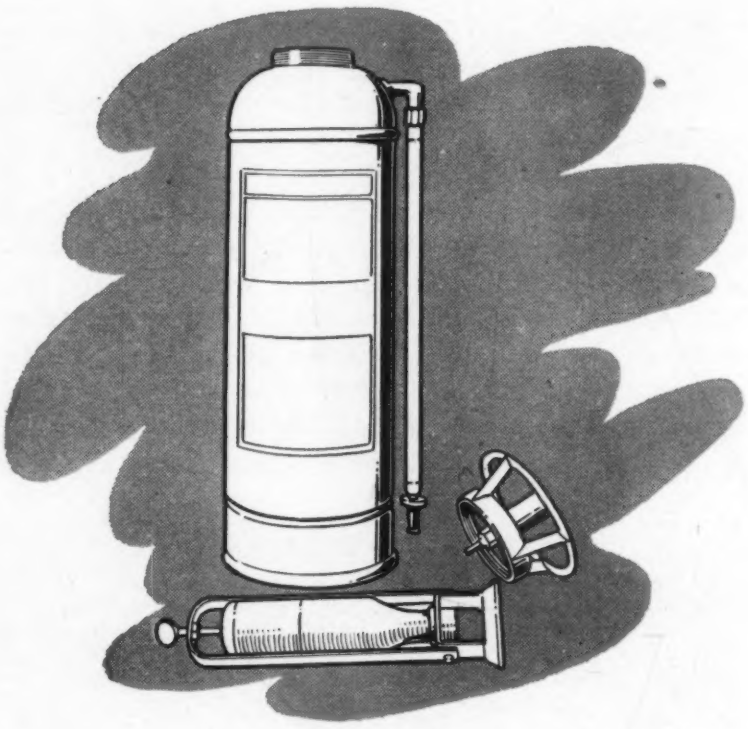
Dry chemical extinguishers are especially suited for fires in flammable liquids and electrical equipment. They are not recommended for telephone switchboards or where delicate contacts and relays are used, because all traces of the chemical would have to be carefully removed, because of its insulating properties. They are also suited for fires in hot asphalt or oils at temperatures above 250 deg. F., because they do not cause foaming or boil-over.

Another special use is for surface fires in cotton, wool, or rayon, although extinguishers with a wetting action should also be available for smoldering and sub-surface fires.

Non-Freeze Extinguishers

For use in unheated buildings, special non-freezing extinguishers are available for any type of fire in ordinary combustibles that can be handled by a soda-acid extinguisher. The approved charge has a freezing point below —40 deg. F.

In one type, the charge is expelled by a chemical



reaction; in another by the release of carbon dioxide from a small gas cylinder when the extinguisher is inverted and bumped on the floor.

Dry Compound for Metal Fires

None of the ordinary extinguishers is suited for fires in magnesium, powdered aluminum, zinc, sodium, or potassium.

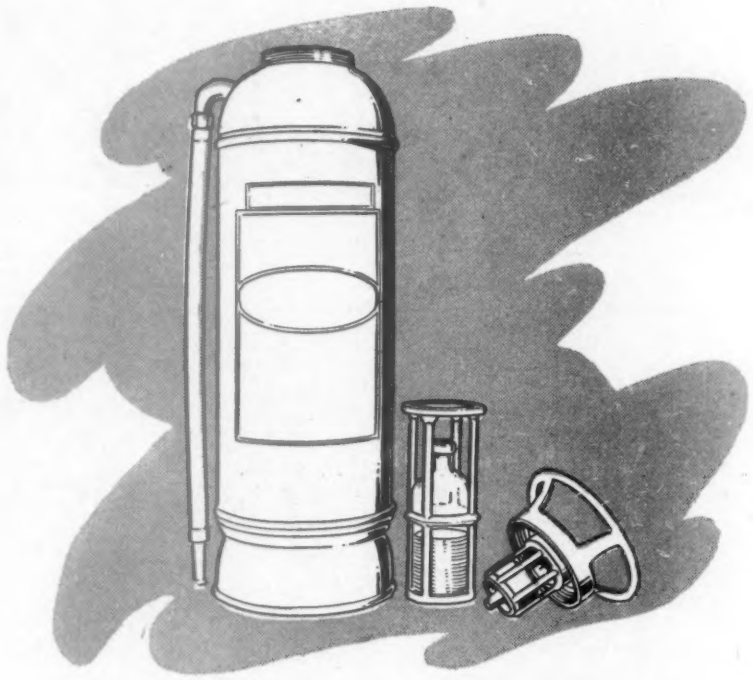
For taking care of such fires a special G-1 fire extinguishing powder has been developed, available in 40-lb. pails and 325-lb. drums. It is usually applied in a layer at least 1½ inches deep. Where large

amounts may be needed, use is made of a special wheeled applicator holding 600 pounds of powder, which is discharged by an electrically driven impeller and a compressor through a 20-ft. hose and applicator nozzle.

Carbon Dioxide Extinguishers

Portable carbon dioxide extinguishers consist of a gas pressure cylinder, a hand-operated valve, and a discharge horn connected to the valve by a short flexible hose or metal tubing. The gas is discharged by operating a hand-wheel, squeeze grip, or trigger-type mechanism. They are available in a wide range of sizes containing from 2 to 750 pounds of carbon dioxide. The larger sizes of such extinguishers are mounted on wheels.

These extinguishers are used chiefly for fires involving electrical equipment and open tanks of flammable liquids. An advantage is that the gas is non-corrosive and leaves no residue. Their use must necessarily be confined to moderately small fires because successful operation of the extinguisher requires close approach.



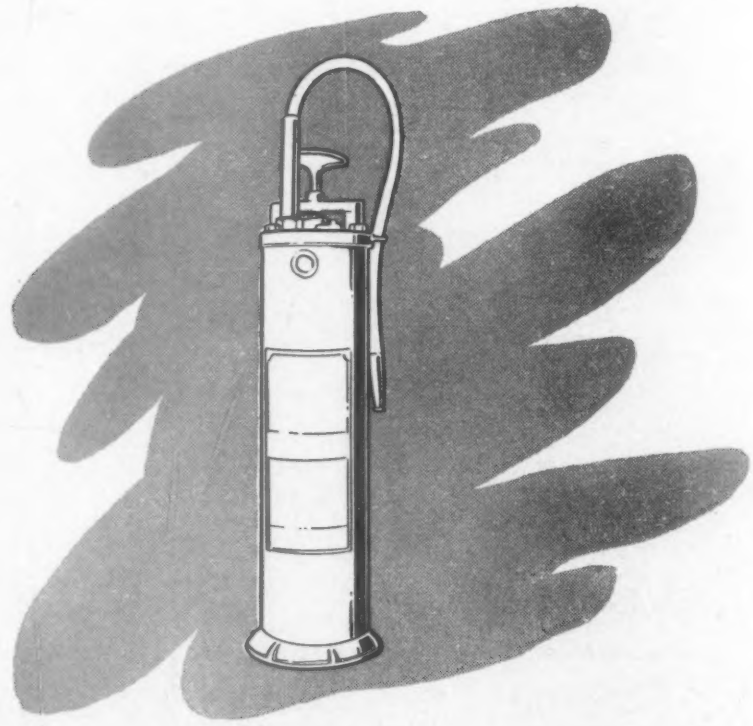
Soda-Acid Extinguishers

The soda-acid extinguisher is the common type widely used for fires in ordinary combustible materials. It contains a water solution of sodium bicarbonate and a bottle of concentrated sulphuric acid, which mix when the extinguisher is inverted, producing carbon dioxide gas which expels the liquid. This type of extinguisher gives a stream of good range and pressure, which penetrates burning material and is useful in getting into cracks and corners. The common size for hand use is 2½-gal. capacity. Extinguishers of this type also are available as wheeled units in 17- and 33-gal. sizes.

These extinguishers are not suitable for putting out fires in oils, greases, flammable liquids, or electrical apparatus.

Vaporizing Liquid Extinguishers

Vaporizing liquid extinguishers, also known as carbon tetrachloride extinguishers, contain a specially processed liquid charge which is propelled either by a manually operated pump, as in the familiar 1-qt. hand pump gun, or by stored gas or air pressure in larger units of from ½- to 3-gal. capacity. These extinguishers are particularly suited for fires in electrical apparatus, for small fires in enclosed places, and for motor-vehicle protection.



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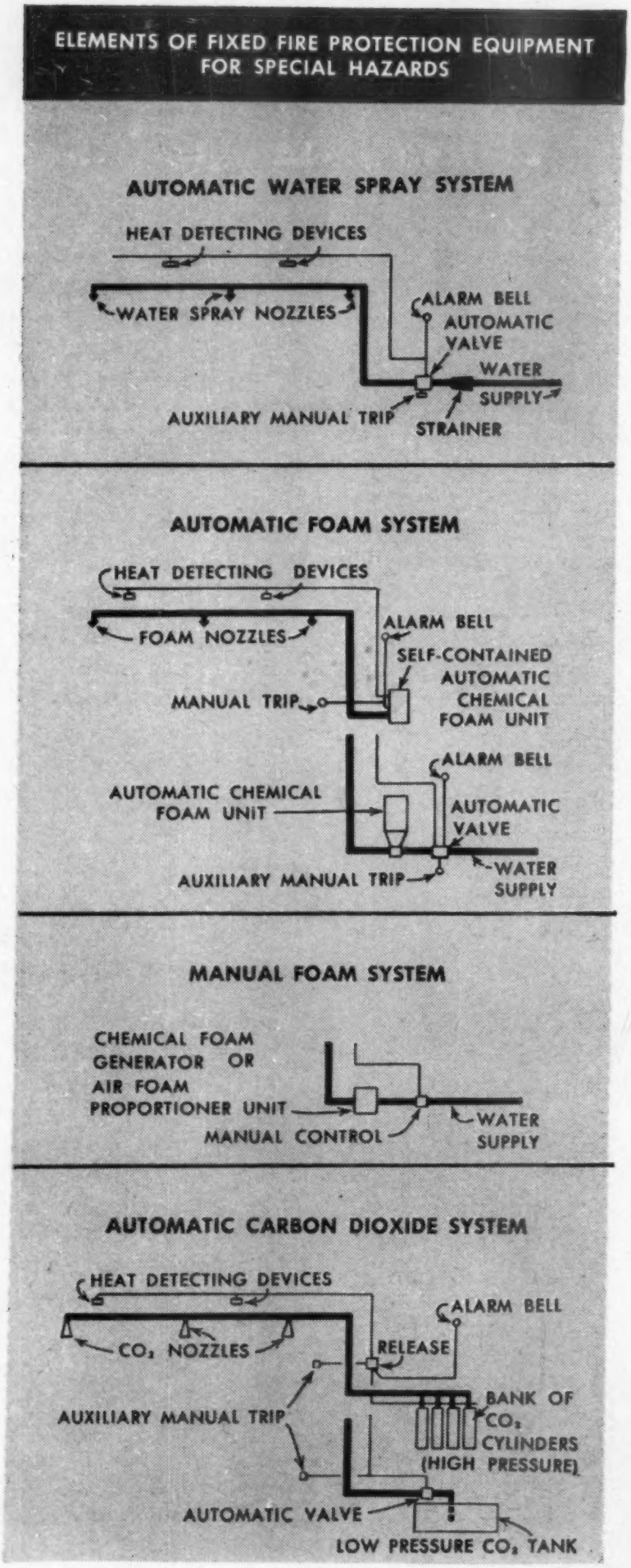
Extinguishing Systems



Special Extinguishing Systems

Fixed installations for the protection of special hazards are of various types. They can be arranged for automatic or manual operation. Each system must be specially engineered for the particular conditions.

Water spray nozzles are supplied by permanently piped systems for extinguishing fires in (1) oil-filled electrical equipment such as transformers, oil switches, and oil pipings; and (2) in open tanks of flammable liquids. To obtain an effective system, consideration must be given to many factors such as nozzle spacing, elevation, direction or angle of discharge, water pressure, wind velocity, and the flash point, viscosity, and temperature of the flammable liquid to be protected.

Fixed foam installations are designed for the protection of tanks of flammable liquids. They consist of foam-producing units attached to piped systems discharging through nozzles just above the liquid surface. A special foam system is available for fires in hot oils or asphalts heated above 250 deg. F. It discharges ordinary chemical foam in a spray from nozzles several feet above the liquid in such a way as not to cause the burning liquid to foam or boil over.

Carbon dioxide installations consist of cylinders or tanks connected to a distributing system of fixed piping with properly located discharge horns or nozzles. The method of application, quantity of gas, and time of discharge depend upon the hazard protected. These systems are suitable for (1) rooms or spaces containing flammable liquids; (2) spaces containing electrical equipment such as transformers and oil switches; (3) enclosed generators; and (4) other enclosures such as fur vaults where the absence of damage by the extinguishing medium is a special advantage, and where a sufficient concentration of the gas can be maintained until extinguishment of the fire is completed.

Operation of these systems should include automatic means of closing doors, windows, shutters, and dampers, and stopping blowers, in order to confine the inert gas.

Approval of Protection

The planning of effective fire protective systems involves many factors. Manufacturers of fire equipment usually provide an engineering service for laying out suggested systems in detail. Insurance companies are always ready to make specific recommendations for proposed protection, and to review blueprints before installation, in order to assure that the system meets the required standards.

SMALL-PLANT HANDLING BY POWER TRUCK

For flexible handling in the smaller plant, consider the power truck as used by Electrolux Corporation, Old Greenwich, Conn. Through the simple device of a centralized dispatch system, which sends units scurrying all over the plant to do a job here or a job there, this company keeps a small fleet busy every minute of the day. Proof of the success of the method is reflected in a production rate that is double the prewar peak.

Secret of the Electrolux system is the placing of full responsibility for all shop traffic in the hands of the storage and receiving supervisor. He is the traffic officer and dispatcher; handles all requests for mechanical aid and works out the pattern of movement and duty for each truck unit; makes it his job to know all handling equipment thoroughly, to establish and extend the several jobs each piece can do. By assigning work so that one trip does for two, or three, or more, he becomes the key figure in making the system work.

Pivot spot in the traffic control plan is a central parking zone and battery charging station. Each piece of motorized handling equipment reports in here upon the completion of its assignment. When trucks pull in to the center for more than a pause or a new assignment, they are plugged into the automatic recharging set-up. Battery charging is, of course, carried on during lunch hours and overnight. This keeps the fleet ready always for instant use.

The fleet at Electrolux consists of a 2000-lb. fork truck, a heavy-duty 4000-lb. tilting fork truck equipped with attachments and fork extensions, two pallet-type electric hand trucks, and a hand-lift truck of 3500-lb. capacity.

Even with this small complement of materials handling tools, the traffic department is able to transport mechanically practically all raw material, components, parts, and products that are received or moved at the plant.

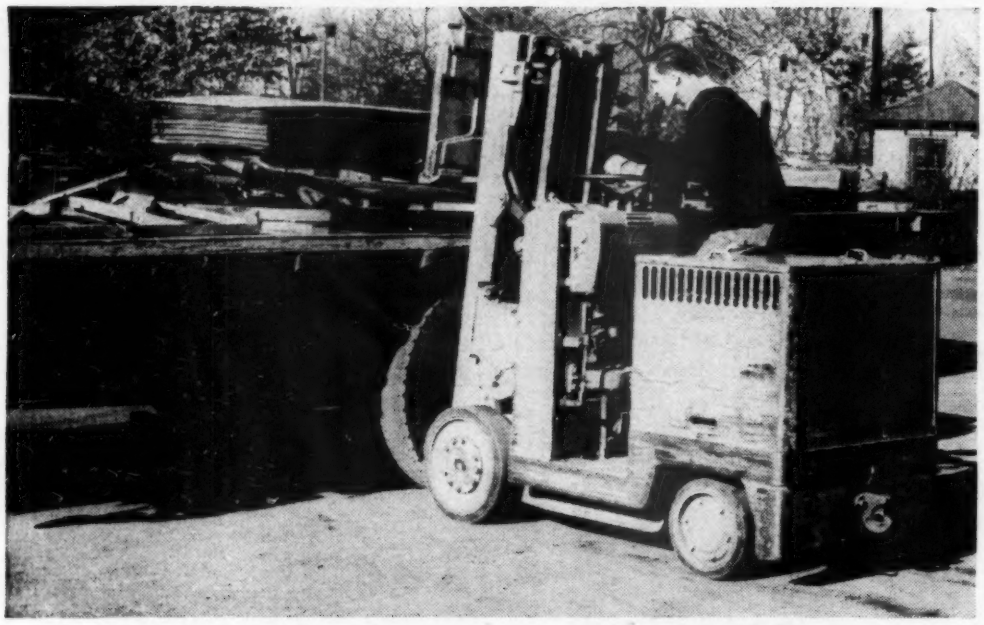
TIERING AND LOADING

Getting the most from a power-truck fleet in this small plant is a matter of taking a lot of different jobs in stride. Here a pallet load of zinc-alloy die-cast counterweights is stacked seven pallets high. Pallets are full-faced on one side only, so that smaller hand-guided trucks can double for the fork truck. It all adds up to getting maximum handling with minimum assignment of equipment. For example, traffic in supplying assembly lines was reduced by developing special metal tote boxes and pans with open ends. These are stacked on pallets (sometimes as many as 24 to a pallet) and delivered to the numerous bench assembly zones. Bolts, screw machine parts, washers, rivets, spacers,

and other bulk items needed in inexhaustible supply are thus handled with orderliness and fewer unit loads.

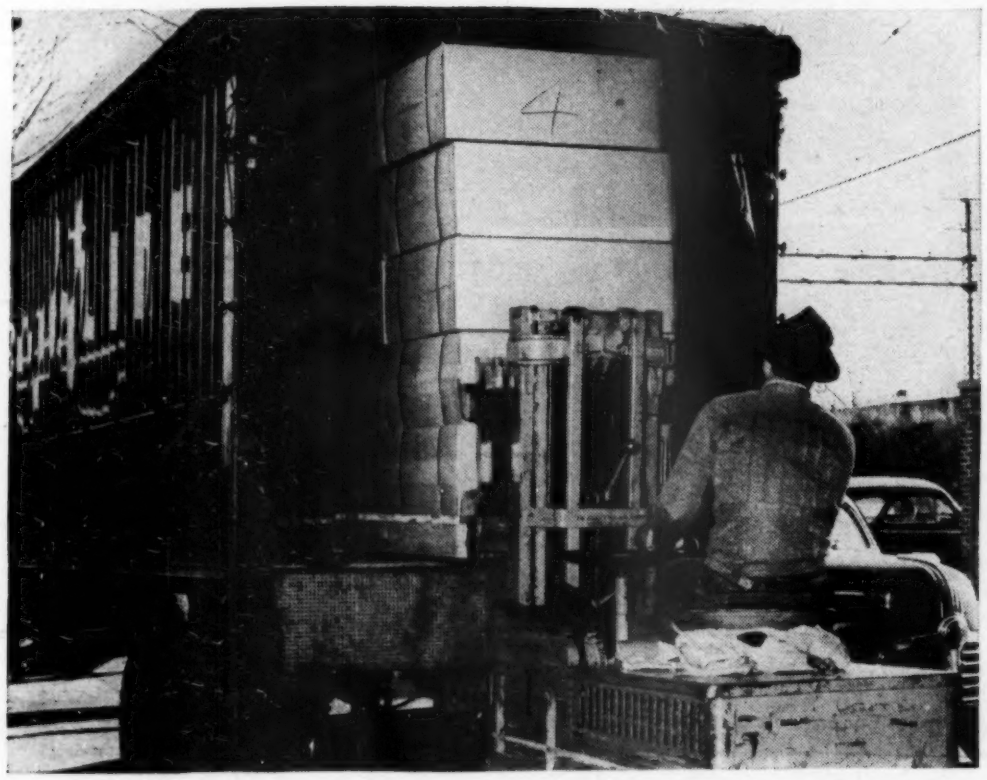
SMALL-TRUCK ASSIGNMENT

The dispatcher himself parks this 12-carboy load of muriatic acid. It is part of his job to know what each piece of transportation equipment can do, as well as where and when to use it. Backed up with practical experience, he can then plan for the widest possible use of his five-truck fleet. Two pieces of equipment, including the one shown at the left, frequently split up assignments on the yard and second-floor levels of the plant, but neither unit is restricted to an area.



HEAVY-DUTY SERVICE

Uncrated sheet (30 inches by 9 feet, 4000-lb. loads and up) is inched to the side of the truck until the fork can thrust under the load for a fully balanced grip. Fork extensions are used if needed. For delivering stock from storage to punches and shears, a trailer truck, 5-ton capacity, is towed by the fork truck. Four-ton loads are delivered in one operation and uncoupled to free the motive unit for other jobs, sometimes as far removed as handling ashes, snow, or coal with a scoop attachment.



MOTOR SHIPMENTS

Skid loads of finished vacuum cleaners, three to a carton, ten cartons to a skid (32x54 inches, screwed hardwood construction), are being loaded for shipment by motor freight. Skid loads are raised to tailgate level, shoved forward so as to advance the entire line previously loaded. When the operation is complete, the truck crew packs the cartons into the truck for the haul, thus emptying the skids, which are retained at the plant for re-use.

ADS TELL WORKERS ABOUT COMPANY PRODUCTS

HENRY A. MORSS, JR. • VICE-PRESIDENT AND WORKS MANAGER, SIMPLEX WIRE & CABLE COMPANY, CAMBRIDGE, MASS.

Workers take very personal interest in the preprints of company ads posted on bulletin boards, with explanatory notes. They complain when they think the product of their department is not getting the publicity they believe it deserves

Good results have been achieved by a simple method of acquainting the personnel of Simplex Wire & Cable Company with some interesting facts about its products. The suggestion to initiate the present educational program came from some of the production department operators. It was not a new idea so far as this plant is concerned.

A few years ago when most of the output went into equipment for the armed services, workers' interest and morale were stimulated by showing where and how some of the company's products were used. Views of a battleship, for example, showing installation of cable, were posted from time to time. These pictures always aroused much interest. With the return to peacetime production this practice was abandoned.

Some time later word was passed along to the labor-management committee that many people in the plant felt that they could do better work, or at least their interest would be stimulated, if they knew more about the uses of the product they are helping to turn out. This matter was referred to the educational committee of the labor-management committee, with a request that a suitable method of meeting this need be worked out.

Eventually it was recommended that preprints of the company's advertisements be posted on the bulletin boards. In these advertisements different products are described and their usual or suggested applications are discussed. To the sheet is attached a typewritten note that amplifies statements in the advertisement or is calculated to interest and inform the workers.

At present about 50 preprints are

EXTRA EXTRA
LATEST NEWS
ABOUT SIMPLEX PLASTEX
A New Data Sheet, richly illustrated, has been issued giving new information about Simplex-PLASTEX insulated wire. It contains important information that will help you to select the right type of wire for your work. It contains engineering information which illustrates why no one plastic compound is satisfactory for all wire and cable uses and lends weight to our statement that to get best results, plastic insulation, like rubber compounds, must be designed for the job in hand.
A copy of this Data Sheet will gladly be sent without obligation. Write for your copy of Data Sheet #114 today.
SIMPLEX WIRES & CABLES
SIMPLEX WIRE & CABLE CO.,
79 SIDNEY ST., CAMBRIDGE 39, MASS.
In this advertisement we want to publicize the fact that we have issued a new data sheet on PLASTEX. This new data sheet which illustrates PLASTEX in its natural colors also contains considerable amount of engineering information which should be extremely valuable to our customers and prospects. None of this information has been issued before by ourselves or by anyone else. Therefore, this should be a particularly interesting piece of literature for our prospective customers. We want to get as wide distribution of this data sheet as we can so as to increase our potential prospects knowledge and thereby get more business from them.

ONE OF THE ADS POSTED BY SIMPLEX ON PLANT BULLETIN BOARDS

sent out every Wednesday to 48 departments. The preprints and the accompanying note are carefully read, and they seem to be accomplishing their purpose in a very satisfactory manner, as two recent incidents show. Members of one department in which a bulletin board was installed complained because the product of their department was not getting enough publicity through advertising. They wanted to see the work of their hands also get into the limelight.

On another occasion members of the lead sheathed cable department voiced objections because one advertisement that was directed to a specific field pointed out the advantages of rubber-sheathed cable over lead cable for certain applications.

SMALL, INDIVIDUAL COMPRESSOR UNITS PROVIDE ECONOMICAL, FLEXIBLE INSTALLATION TO FILL VARYING LOCAL NEEDS

SMALL COMPRESSORS SERVE LOCAL AREAS

By adding small, individually powered air compressors as needed, McQuay, Inc., Minneapolis, air conditioning and commercial refrigeration manufacturer, was enabled to simplify considerably its problem of plant expansion.

When war broke out this company had a central air compressor installation that adequately met the somewhat limited requirements of its main plant. Later, as the amount of war work began to increase, a large factory building across the street was added, doubling the plant floor space.

As the number and variety of industrial operations began to grow, so, of course, did the demand for compressed air. Yet at no time was it possible, because of uncertain production requirements, to estimate with accuracy the extent of the compressed air load that would eventually be built up.

Hence the problem arose of deciding whether to install large, central air compressors capable of meeting unpredictable needs of both the central and the adjacent plant, or to put in small, individually powered air compressors, as the need for air increased. The small air compressor units were chosen.

A number of considerations prompted this decision. There was, for example, no suitable space for a large compressor plant. Moreover, part of the new building was without heat; if a central compressed air system were installed, pipelines carried through the unheated area would require insulation.

Another consideration that led to the adoption of individual air compressors in various departments stemmed from the fact that several different pressures of compressed air were required.

For example, air at 300 pounds pressure per square inch (not necessarily dry) is needed for use in testing certain products. For similar purposes air at 175 pounds pressure is required. Another requirement is air at 100 pounds suitably dried for powering air tools, holding devices, and other equipment. Again, there is need for air at 10 pounds pressure, which has been dried to a dew point of 60 deg. F., for use in dehydrating coils for refrigeration and air conditioning applications.

Air costs more at higher pressures and at higher degrees of dryness. With a central compressing

system all air could, of course, be compressed to 300 pounds pressure and then reduced to meet the particular needs. But in a reduction process of this kind there is a certain amount of energy wastage.

By using many small compressors and installing drying apparatus here and there in the two plants, varying requirements in quantity and in quality of air were satisfactorily answered. Certain departments operate around the clock. With local compressors, just enough air is produced to answer the demands of those departments. Thus the initial investment for the amount of air actually used was kept at a minimum.

In addition to providing flexibility in air service, with a small amount of piping, the use of small local compressors made it possible to have a ready source of air at all times. If one compressor should break down, it was a simple matter to put another one in its place.

As it worked out, a system was devised whereby several compressors were placed in banks at various locations around the factory. Air from such a group was fed into a trunk pipeline overhead.

Installation of a system of valves enabled workers to control the air in any one feeder line. By linking the output of compressors, there was always an economical standby source of air in the event that one compressor failed to operate.

Probably more time, effort, and expense are involved in maintenance of many small units as compared with servicing one large, central system. That is to be expected. Where the air load is heavy and is known, a central air compressing system may supply air more economically than individually powered units.

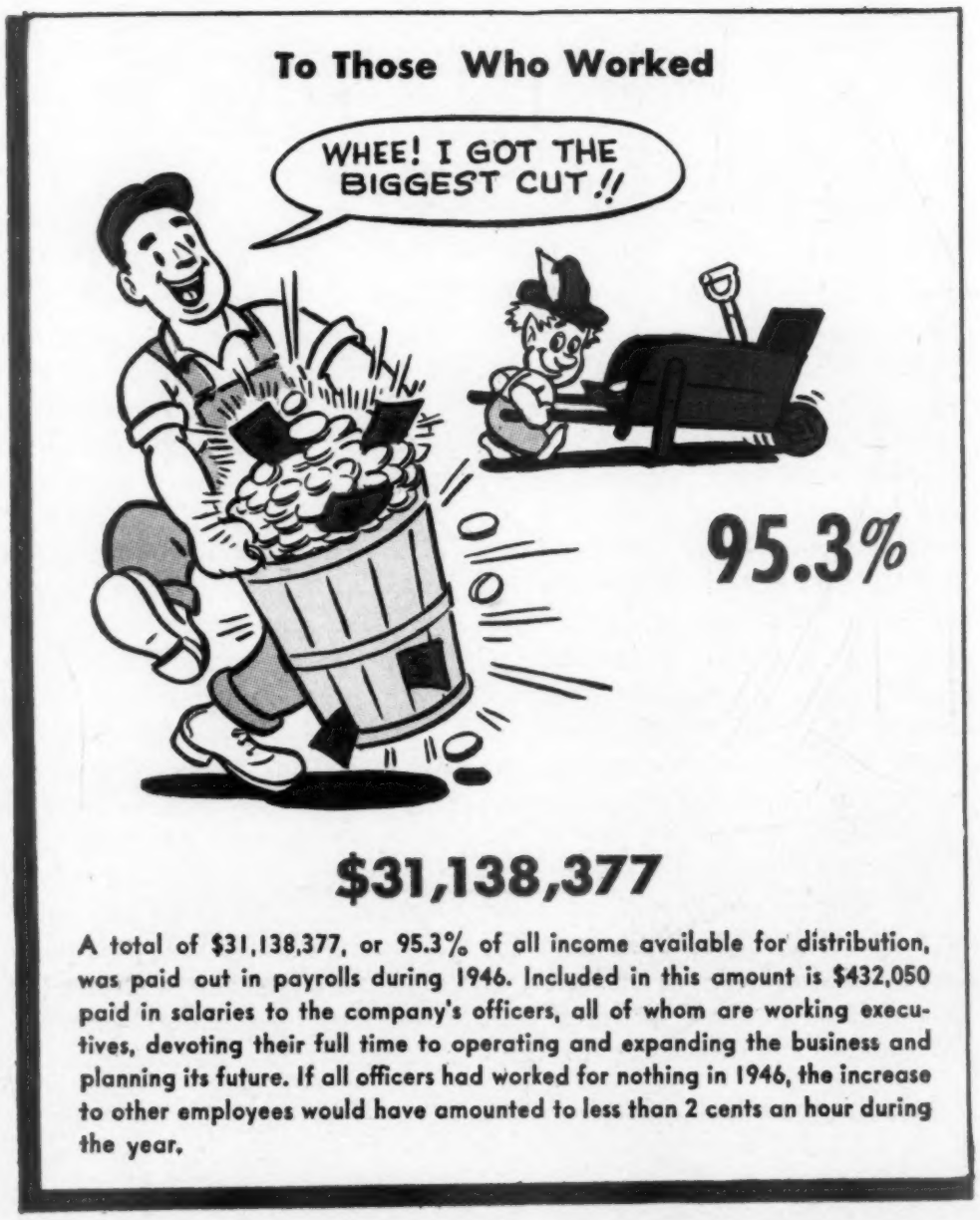
For these reasons the local unit system may eventually be partially replaced by a central air system. But in its initial stages of expansion of a plant, in a period when its ultimate air load cannot be accurately estimated, a system of small air compressors is worthy of consideration as a ready solution of the air supply problem.

WORKERS GET WAGE-AND-PROFIT DATA BY PICTURE-STORY REPORT

Many times the pacemaker in producing information about the company for workers, Thompson Products is again in front with its 1946 annual report to employees.

Reproduced here is one panel of ten on one side of a color-and-cartoon-splashed folder. Six previous cartoons with concise captions explained how the company had $64,012,859 in income to work with during the year—and how taxes, costs of materials and supplies, depreciation, and other expenses whittled that down to $32,673,796 of income available for distribution. This income went mostly to employees, some to stockholders, some back into the business.

The folder had a cartoon cover. Along with its easy-to-understand breakdown showing where the money came from and how it was divided, it carried a brief message from President F. C. Crawford on the state of the business as it went into the new year.


To Those Who Worked
WHEE! I GOT THE BIGGEST CUT!!
95.3%
$31,138,377
A total of $31,138,377, or 95.3% of all income available for distribution, was paid out in payrolls during 1946. Included in this amount is $432,050 paid in salaries to the company's officers, all of whom are working executives, devoting their full time to operating and expanding the business and planning its future. If all officers had worked for nothing in 1946, the increase to other employees would have amounted to less than 2 cents an hour during the year.

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

We're moving into the best-advertised business recession on record. It won't show up much for the next three to four months. But it will make headlines after that.

How deep it will be and how long it will last? These are the important questions now.

No one can give a hard and fast answer. It depends too much on how people react. But here's the way most business analysts think it will develop.

•

The soft goods boom is running out. Output of women's coats and suits is a fifth lower than last year; frozen food production is being cut back 10 to 15 per cent. The blight will spread to other lines soon.

Retail sales didn't come up to the mark this Easter. So stores are holding back orders. They are running bargain sales to cut inventories. This puts pressure on prices, forces some manufacturers to cut production. The process snowballs once it starts.

Three things explain why the soft goods boom is trailing out: (1) Backlog demand is filled in most lines; (2) people are buying hard goods so they haven't enough money left to buy the same volume of soft goods at present high prices; (3) inventories are filled up so stores are buying only what they can sell—over 5 per cent of last year's production went to fill pipelines.

•

The hard goods boom is just getting under way. Its momentum should carry most manufacturers through a readjustment in soft goods.

There are some exceptions. Lumber prices are sagging. Small appliances, freezers, and high-priced cars are hard to sell.

But manufacturers of big items are booked solid well into next year. Automobile demand will hold up all year. Most types of machinery will be hard to get for at least a year. This will keep steel mills running at high rates.

Construction had been counted on to take up the slack when soft goods began to lag. But it doesn't look as though it will work that nicely.

Soaring building costs have priced new homes out of the market. More and more businessmen are said to be putting expansion plans on the shelf.

The building industry is so spread out that it's hard to know just what's going on. But recent reports show signs of a definite lag in new building. Many experts doubt that new construction will go much above last year's total.

What's more, there is a real chance of a building slump after mid-year. If builders start to pare costs now, it won't happen. But, if they don't, people will stop buying new homes and new plants.

There is a big demand for new homes, new plants, new highways, new stores, at reasonable prices. So any building slump should be short-lived. Once costs come down, building would pick up again. But it would drag down general business while it lasted. Add in the coming shakeout in soft goods production and you see why many business forecasters now think the 1947 recession will be deeper than they figured a few months ago.

•

Don't be too disturbed by recession talk, however. There's always a tendency to exaggerate the seriousness of changes in the business outlook.

True, the recession has started. But it won't be a depression like 1929-32. All the signs point to a setback no worse than the 1937-38 recession.

It would be that bad only if both building and soft goods hit the skids together. And it's by no means certain that this will happen.

It would be much less serious than the 1937-38 recession if prices adjusted quickly. That would rule out any major building slump and would cushion the soft goods adjustment.

It's easy to overlook the strong points when all the talk stresses recession. Here's a brief catalog of the things that will halt a recession in its tracks:

There is still a huge back-up demand for most things; so people will start buying again before prices fall far. Prices will hit bottom sooner than ever before — government supports will limit the drop in farm prices to a third; and rigid wage rates will limit the drop in industrial prices.

Any drop in national income will lead to automatic government pump-priming on a gigantic scale. A one-fifth drop in national income would mean a federal deficit of around $15 billions. It would work the way defense spending did in 1941.

These things won't prevent a recession. But with any kind of luck they'll keep it from getting out of hand.

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

A Truman veto of strike-control legislation would assure a clear-cut campaign issue in '48 — even if a Republican-Southern Democratic coalition overrode it. With foreign policy bipartisan, this could be a decisive factor in the elections.

Who will take credit? That will depend on whether we get any legislation at all. And on what happens to strikes — and the economy — in the next year.

In any event, a Truman veto would endear him to CIO, AFL, and railroad brotherhood leaders. He could win back some liberal support alienated by last year's impulsive plea for drastic curbs to end the rail strike.

Peaceful settlements in steel, electrical, rubber, glass, and other major industries bolster Truman's hand. They also strengthen chances of making a veto stick. So far, Truman's 61 vetoes have all stuck.

(The 15-cent increases in steel and electrical equipment were not in hourly rates, but in hourly cost "package" including fringe adjustments. Hourly rate rises clustered around 11 and 12 cents.)

If we get new law, court tests will follow. Organized labor will force them. Thus it may take years before rights of employers, unions, individual workers, and the public may be known with any certainty.

Only this year did it become clear that the 1935 Wagner Act required employers to recognize independent unions of foremen. And it took a Supreme Court decision . . . in the Packard case.

Until then, NLRB itself flip-flopped on both sides of the question. Even so, the status of mixed or affiliated foremen's unions — under the old law — remained unsettled. So it will be under a new law.

•

Legal tests will come, not so much from outright defiance as from union efforts to slip through any loopholes, to take advantage of technicalities. Faced with an anti-closed-shop law in Arizona, one union already has signed a contract whereby the employer will give it "a chance" to fill all job vacancies.

What's more, deviation from established bargaining tactics by management and labor will itself raise new legal issues.

Congress, writing new law, has naturally claimed the labor spotlight. This will last only until the law is on the books. Then attention will shift to the Supreme Court for final answers.

On the closed shop, conflict between state and federal laws may raise legal tangles. Twelve states now ban any form of compulsory union membership — Arizona, Arkansas, Florida, Georgia, Nebraska, New Mexico, North Carolina, North Dakota, South Dakota, Tennessee, Texas, and Virginia. Three others (Wisconsin, Colorado, Kansas) regulate it.

Congress, on the other hand, is inclined to bar only the out-and-out closed shop, which permits hiring only through unions. It would okay milder forms like union shop (join only after hiring) and maintenance of membership (once in, can't resign).

But Congress would leave more control to states, encourage growth of state policies on closed shop, utility disputes, and other issues. Already utility strikes are banned in New Jersey, Virginia, Indiana. In New York public employees can't strike.

Yet, where Wagner Act has jurisdiction, it takes precedence over a state law. This the Supreme Court held in reversing a foreman bargaining decision of New York's Labor Relations Board against Bethlehem and Allegheny-Ludlum steel companies.

In other decisions, the Supreme Court (1) permitted Halliburton Oil Well Cementing Company to consider weekly guaranteed pay as including overtime and (2) ruled that job seniority for veterans cannot be frozen indefinitely (Trailmobile).

•

Union militancy in schools, telephone offices, and Wall Street spurs organization among office workers in unionized plants. UAW-CIO, opening drive in this sector, stubbed its toe at Federal Mogul in Detroit. Machinists Union did it backwards in one Cleveland plant — office help first, then shop.

SCORING STRIKES. New York led all states with 682 strikes in 1946. Pennsylvania, with 639, had most workers involved—877,000. Of 5000 strikes, less than half were over wages, but they involved three-fourths of the 5,000,000 strikers.

TRENDS. In 1946, workers covered by union contracts climbed to 15 million, rise of one million. Number under closed or union shop rose from 6.2 to 7.4 million. But maintenance of membership coverage, which boomed during war, dropped from 3.9 to 3.6 million.

FIRST. Weekly news broadcast sponsored by CIO Electrical Workers. It's Leland Stowe, every Wednesday night, on Mutual network.

OPERATING SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishments. Accepted articles will be paid for

Fitted trucks for repair work and new installations bring all necessary tools and equipment to the job, eliminating trips back to the supply room. Trays are sloping for easy visibility, and small items are placed in totepans which can be carried directly to the job

FITTED TRUCKS ELIMINATE TRIPS TO STOCK CRIB

CARL W. GRAMLICH, Maintenance Engineer, Galvin Manufacturing Corporation, Chicago

When the maintenance department electrician or pipefitter goes out on a repair or new installation job at Galvin Manufacturing, he has all his supplies and tools at his command. No longer are extra trips back to the maintenance department stock crib for additional supplies required. Time is saved, there is less cluttering, and the men do better work.

Work simplification principles have been applied to the design of the trucks. Shelves are inclined to improve visibility of stocked items, and divided to prevent mixing of supplies. Some fittings and small supplies are placed in small totepans so that they can be taken directly to the job, thus reducing the number of trips back to the truck. Tools are pre-arranged on all trucks. The old rule has been applied—"A place for everything and everything in its place."

Trucks are completely restocked at the beginning and mid-point of each shift. There is no chance that a man will take a truck out on the job lacking some parts. The main crib attendant has the responsibility of replenishing trucks each time they are brought back from a job.

This system has resulted in better workmanship, less time required to perform the various jobs, and reduction in loss and breakage of supplies.

Low chairs which roll on casters have aided production and made operators' work easier at the Willys-Overland plant in Toledo. No longer do workers have to bend over, lie down, or get into awkward positions to do underbody assembly work. The low rolling chairs allow them to sit comfortably, move about quickly from one position to another

SWINGING RACKS SPEED GLASS INSPECTION

E. E. REDFERN, Plant Industrial Engineer, Pittsburgh Plate Glass Company, Works No. 1, Creighton, Pa.

An improvement in the method of inspecting certain large mirror glass at the Creighton glass works has recently been developed.

In the old method, a helper lifted a pane of glass to a table in front of a fluorescent light battery and held it while an inspector wiped it clean and examined it for defects.

Inspection racks that have reduced inspection costs 40 per cent have now been installed. Two standards, each designed to hold a single plate of glass, are mounted opposite each other on masts. Standards may be raised or lowered, and are hinged to the masts so that they swing on a horizontal

Inspector examines one piece of glass while a second piece is being placed in the other half of frame. Helper also cleans glass, saving valuable time for the inspector

plane and permit inspection at various angles.

While the helper loads one frame and cleans the glass, the inspector examines the glass in the other frame for defects. When the inspection is completed and defects are marked, the inspector moves to the other frame. The helper unloads the inspected pane and reloads the frame. The skilled inspector is relieved of unskilled work, a better examination of the product results, and the entire process is done with a saving in time and effort.

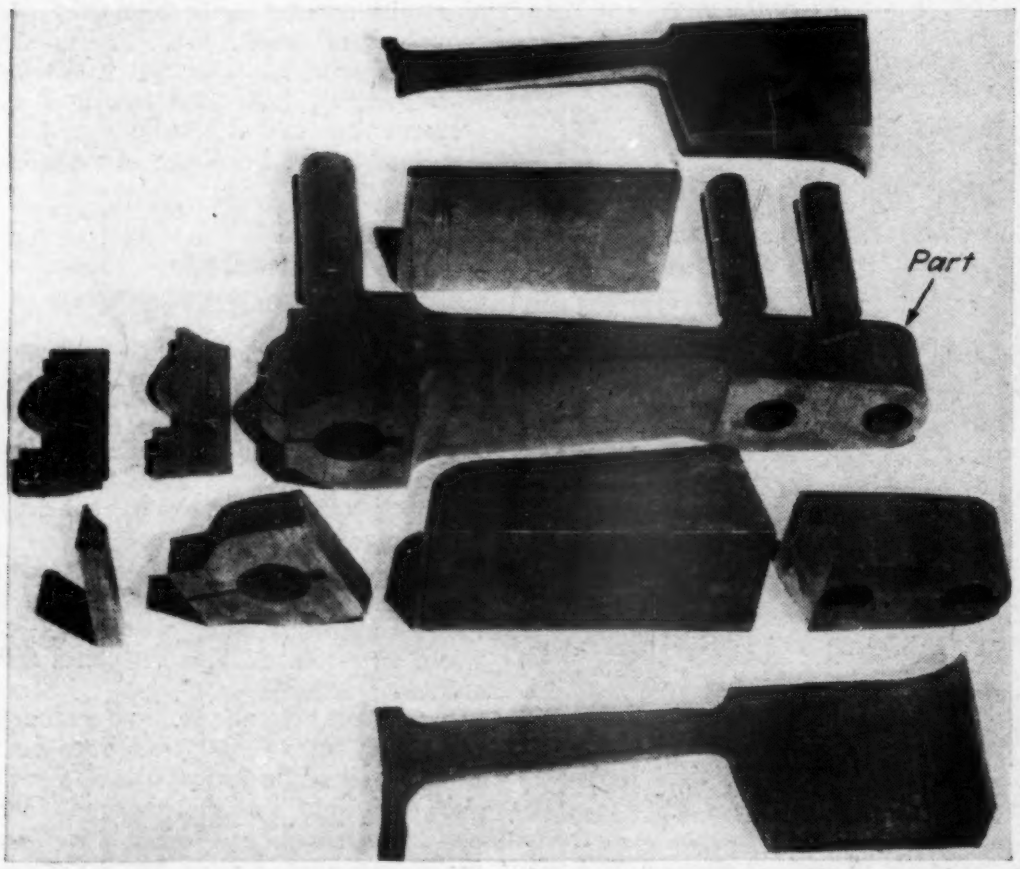
EMERGENCY PARTS BY CONTOUR SAWING

H. J. CHAMBERLAND, Springfield, Mass.

A part for a printing press had to be replaced. To machine it by the conventional method would have taken 15 hours, and cost $14.30. By using contour sawing, it was made in 5½ hours, at a cost of $7.40.

The company operating the press lost $50 per hour during the breakdown, so by shortening the downtime period, $475 was saved.

The part was made out of a 3x4-in. block of 1030 cold rolled steel. The bandsaw was fitted with $\frac{3}{16}$-in., 14-pitch, 0.042-in.-thick blade, set at a velocity of 150 f.p.m. Proper selection of blade and velocity was essential, because the nature of the work required use of a real precision tool, heat-treated, with proper depth of tooth hardness to provide flexibility to withstand the strain of contour sawing.



Contour sawing was the method used in making a replacement part for a printing press. The pieces cut out of the 3x4-in. steel block in the making of the part and the part itself are shown here

"We're glad to see you," reads the visitor at Sylvania Electric Products, Inc., Emporium, Pa., when he opens up the doors of this company's welcoming folder. "Meet some of our men" is the cordial invitation over a list of plant executives. Revealed at the same time is a display of 27 typical Sylvania products. On the back of the folder, typical Sylvania plants

NUMBERED FIXTURES EXPEDITE MAINTENANCE

S. A. KARCH, Plant Engineer, General Instrument Corporation, Elizabeth, N. J.

Maintenance of over 2000 fluorescent lighting fixtures in our plant has been simplified by numbering each fixture. A black number has been stenciled on the white underside of the reflector where it can easily be seen from the floor.

In the event a fixture requires immediate attention beyond the customary group cleaning and replacement program in effect, its number is reported to the maintenance department. When the maintenance man arrives on the floor, he loses little time searching for the defective luminaire. Also, he need not disturb operators by questioning as to its wherebouts.

The numbering plan was originally conceived in a project to determine lamp life for formulation of a replacement program. A numerical record of necessary lamp and parts re-

placements, kept to this date, reveals information on poor quality or other defects. This record is particularly useful when too frequent replacements occur, because it shows a need for examination of other factors, including possibly severe operating conditions, that can be improved upon.

USE OF GREEK CROSS IN RED IS RESTRICTED

FACTORY has been asked by R. M. Hollingshead Corporation, Camden, N. J., to advise readers that it has discovered that the use of a red Greek cross in its good housekeeping program (FACTORY, March, 1947, page 130) was an inadvertent violation of an Act of Congress, approved January 5, 1905. Hollingshead has since substituted its new trademark for the familiar red cross.

The Act in question restricts the use of the Greek cross colored in red, or any imitation thereof, to the American Red Cross and the Sanitary Corps of the Army and Navy, and to a limited number of business concerns which made use of the insigne prior to 1905.

If your plant is using the symbol in the manner suggested by the R. M. Hollingshead Corporation, it would be well to make such modifications as the law requires.

GUIDED TOURS BUILD GOOD WILL

Plant tours have been resumed at the Caterpillar Tractor Company, Peoria, Ill., now that wartime restrictions have been lifted. The company believes there are few better ways to "sell" itself to the people who buy its products.

A supervisor of escort service and his specially trained assistants conduct tours twice daily, and on special occasions when called for. Visitors are welcomed and "briefed" by the supervisor, then taken through the plant in groups of ten.

In eight weeks after renewing this war-interrupted service, nearly 2000 visitors have been escorted through the

An escort explains modernized assembly methods to visitors on one of Caterpillar's guided tours

80-acre plant. Before the war, as many as 19,000 guests in one year were shown through.

Visitors are owners and operators of Caterpillar equipment, potential customers, representatives from firms throughout this country and many foreign nations. High school, college, and various organizational groups also are welcomed.

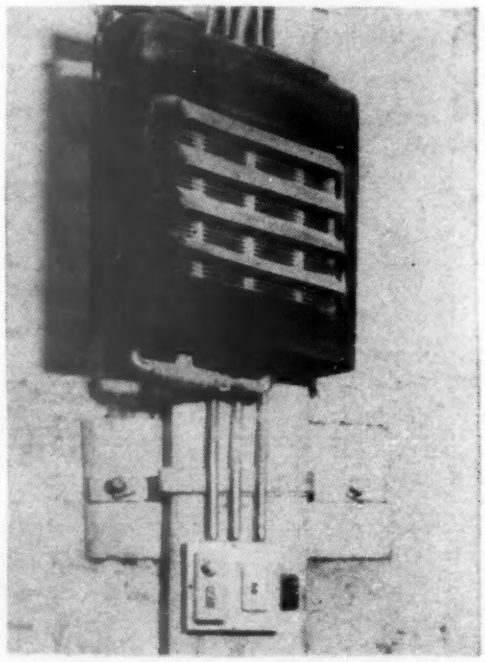
ELECTRIC HEATING— MORE FLOOR SPACE

SOURCE: Electromode Corp., Rochester, N. Y.

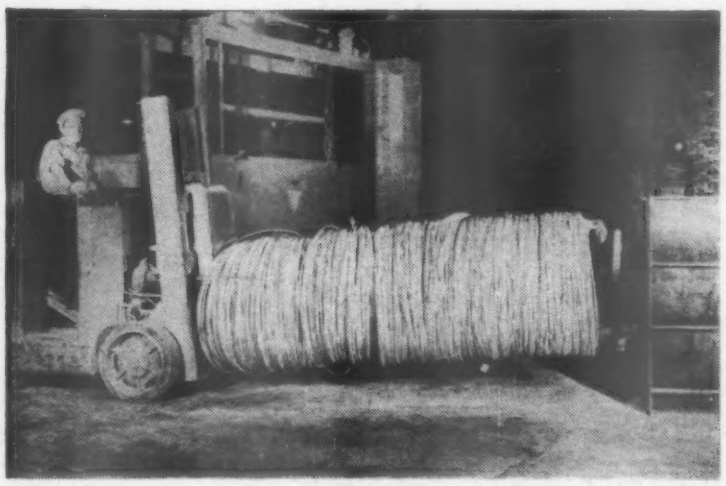
One of the unusual advantages gained by a recent installation of all-electric unit heaters in the flour mill of Mountain City Mill Company, Chattanooga, was the release of floor space for productive purposes which was formerly occupied by the boiler room of the plant's heating system.

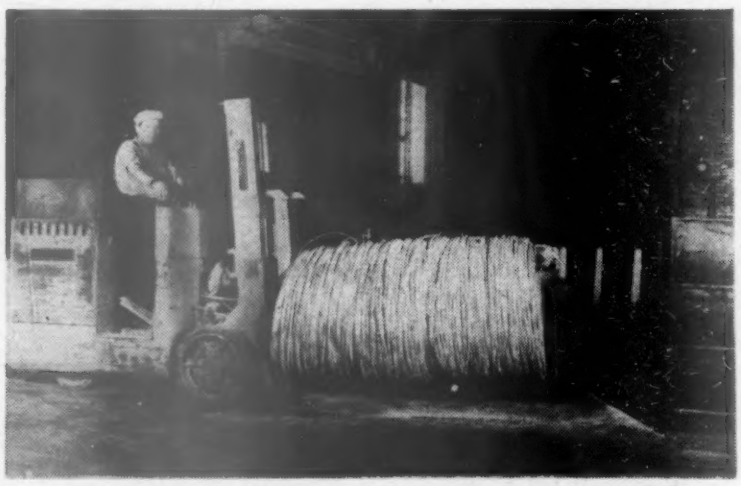
The main 5-story building of 598,650 cubic feet content is now heated by 50 unit heaters ranging in capacity from 7.5 to 20 kw., and involving a total connected heating load of 655.5 kw. During winter months the plant is heated 24 hours a day, 7 days a week.

Thermostatic controls act to eliminate unnecessary heater operation and reduce waste, since each unit operates only when heat is required in that particular area. The enclosed construc-



tion of the electric heating element affords complete protection against fire and explosion hazards.





The same driver, the same truck, the same load! After the driver picks up a load of coiled wire rod (left) from the bake house at American Steel & Wire Company, Trenton, N. J., he butts the 9-ft ram of his truck against a steel bumper—and both ram and load collapse to 6 feet (right) —obviously easier to maneuver. Unloaded, the hooked end of the ram is engaged in a length of steel rope attached to strong springs, and the ram is lengthened again to its 9 feet—all ready for its next load. *Source:* United States Steel Corporation Subsidiaries

maintenance data 144 sheet

NEMA SETS STANDARDS FOR FLANGE MOTOR MOUNTING

Development of standards for a universal flange mounting, designated the NEMA "D" flange, for both horizontal and vertical end-shield-mounted electric motors has been announced by the National Electrical Manufacturers' Association.

Five "D" flanges accommodate the spread of the sixteen different NEMA standardized motor frame sizes.

This new flange has four principal features:

1. The flange has a male rabbet.
2. Face of flange is in line with shaft shoulder.
3. Diameter of flange is not greater than motor diameter, except on frames 203 and 204.
4. Motor mounts on machine from motor side. Mounting bolts go through flange from motor side.

With this mounting the only machining necessary on a machine tool or other machine frame, upon which the motor fits, covers an area equal to the diameter of the rabbet. It is not necessary to finish the larger surface needed where a female rabbet fit is used.

Flanges for smaller motors have four holes for mounting bolts; those for larger motors are provided with eight holes to carry the extra weight. Motors built with NEMA "D" flanges can be had either with or without conventional motor feet.

STANDARD DIMENSIONS FOR TYPE D FLANGE-MOUNTED, D.C. AND A.C. MOTORS

Frame Number	AK*	AJ	BD (Max.)	AH	BC	U	Key		Clearance Holes BF	
							Width	Thickness	Size	Number
203D	9	10	11	2¼	0	¾	3/16	3/16	17/32	4
204D	9	10	11	2¼	0	¾	3/16	3/16	17/32	4
224D	9	10	11	3	0	1	¼	¼	17/32	4
225D	9	10	11	3	0	1	¼	¼	17/32	4
254D	9	10	11	3⅜	0	1⅛	¼	¼	17/32	4
284D	11	12½	14	3¾	0	1¼	¼	¼	13/16	4
324D	11	12½	14	4⅞	0	1⅝	⅜	⅜	13/16	4
326D	11	12½	14	4⅞	0	1⅝	⅜	⅜	13/16	4
364D	14	16	18	5⅝	0	1⅞	½	½	13/16	4
365D	14	16	18	5⅝	0	1⅞	½	½	13/16	4
404D	14	16	18	6⅜	0	2⅛	½	½	13/16	4
405D	14	16	18	6⅜	0	2⅛	½	½	13/16	4
444D	18	20	22	7⅛	0	2⅜	⅝	⅝	13/16	8
445D	18	20	22	7⅛	0	2⅜	⅝	⅝	13/16	8
504D	18	22	25	8⅝	0	2⅞	¾	¾	13/16	8
505D	18	22	25	8⅝	0	2⅞	¾	¾	13/16	8
364SD	14	16	18	3¼	0	1⅝	⅜	⅜	13/16	4
365SD	14	16	18	3¼	0	1⅝	⅜	⅜	13/16	4
404SD	14	16	18	3¾	0	1⅞	½	½	13/16	4
405SD	14	16	18	3¾	0	1⅞	½	½	13/16	4
444SD	18	20	22	4¼	0	2⅛	½	½	13/16	8
445SD	18	20	22	4¼	0	2⅛	½	½	13/16	8
504SD	18	22	25	4¼	0	2⅛	½	½	13/16	8
505SD	18	22	25	4¼	0	2⅛	½	½	13/16	8

All dimensions are in inches

* Tolerance for the AK dimension shall be + 0.000, — 0.005 inch

NOTE I. See Figures 1, 2, 3, and 4 for the meaning of the letter dimensions

NOTE II. These dimensions may also be applied to vertical motors, in which case the frame designation may have the suffix letters DV or SVD

AUTOMATIC FORK TRUCK

DEPENDABLE

POWER

CUT MATERIALS HANDLING COSTS
MOVE MORE GOODS WITH SAFETY

You can do both ... and MORE ... when you use
EXIDE-IRONCLAD POWERED Electric Trucks

Wherever goods are lifted, hauled and stacked, efficient battery electric trucks and Exide-Ironclad power are effecting important economies all along the line. They do more work per man per hour and at less cost. They do it with greater ease and safety. And they maintain a steady pace straight through to the end of every shift.

Exide-Ironclad batteries have the high power ability, the high maintained voltage and the high capacity that materials handling demands. You can always count on Exide-Ironclad batteries for dependability, long life and ease of maintenance.

Write us for a FREE copy of Exide-Ironclad Topics which contains "Case Studies" of materials handling problems. It tells how to cut handling costs up to 50% ... covers latest developments in handling materials from receiving to shipping.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 20, Pa.
Exide Batteries of Canada, Limited, Toronto

AUTOMATIC TRANSPORTER

maintenance data sheet 145

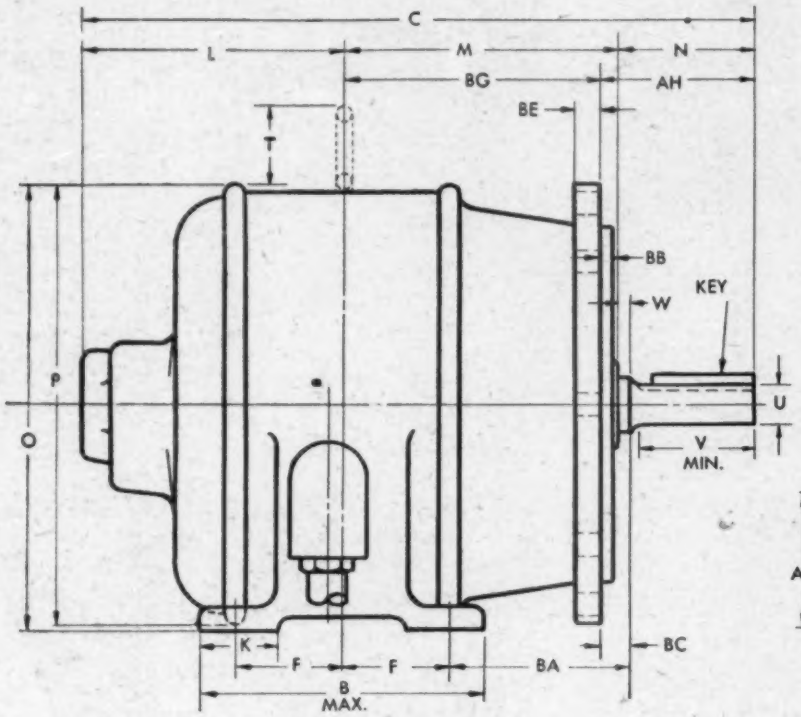


FIGURE 1. Dimension sheet for Type D flange-mounted motors, side view with feet

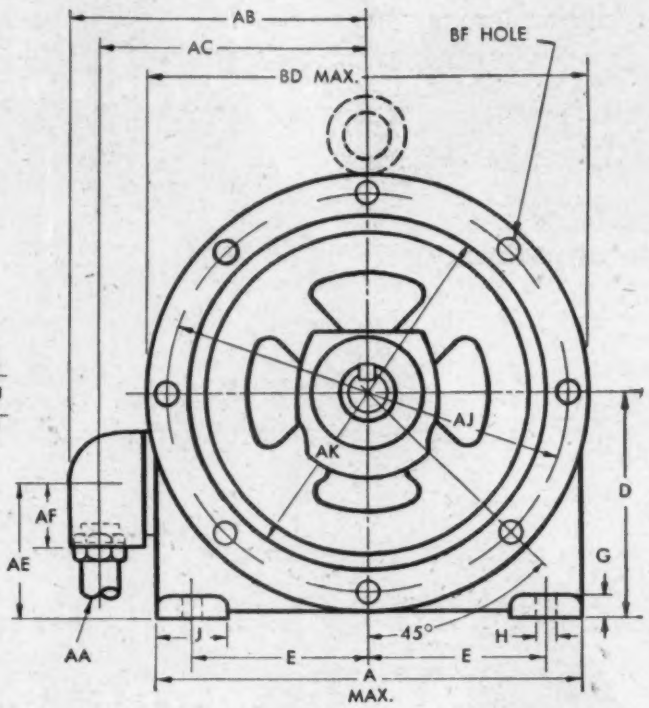


FIGURE 2. Dimension sheet for Type D flange-mounted motors, front view with feet. Where four holes (BF) are used, they are 45 degrees from the horizontal and vertical center lines

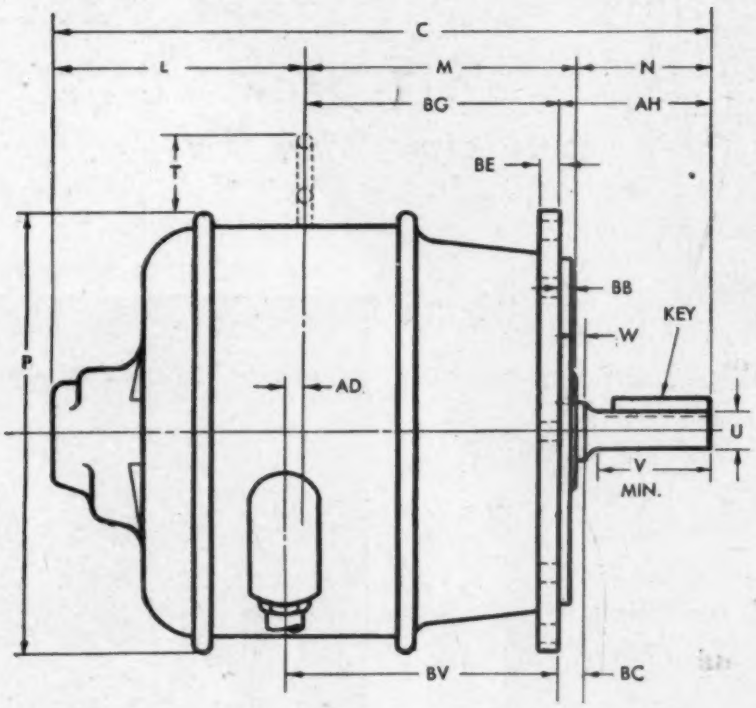


FIGURE 3. Dimension sheet for Type D flange-mounted motors, side view without feet

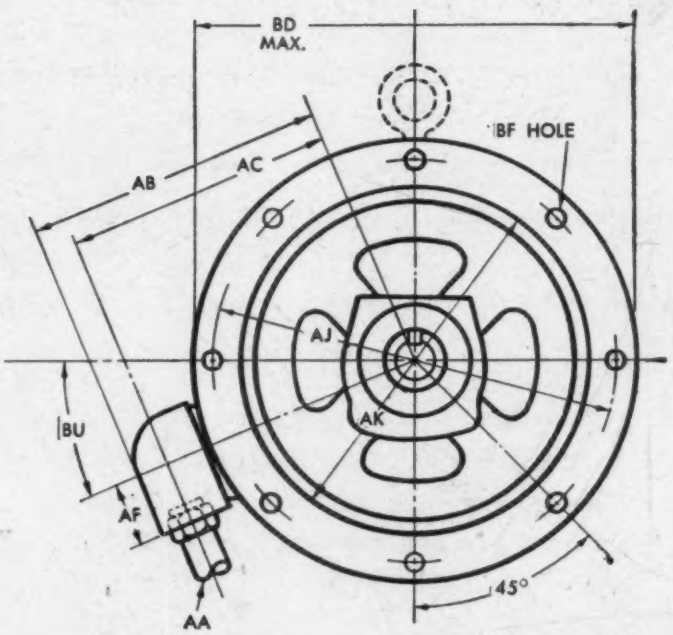
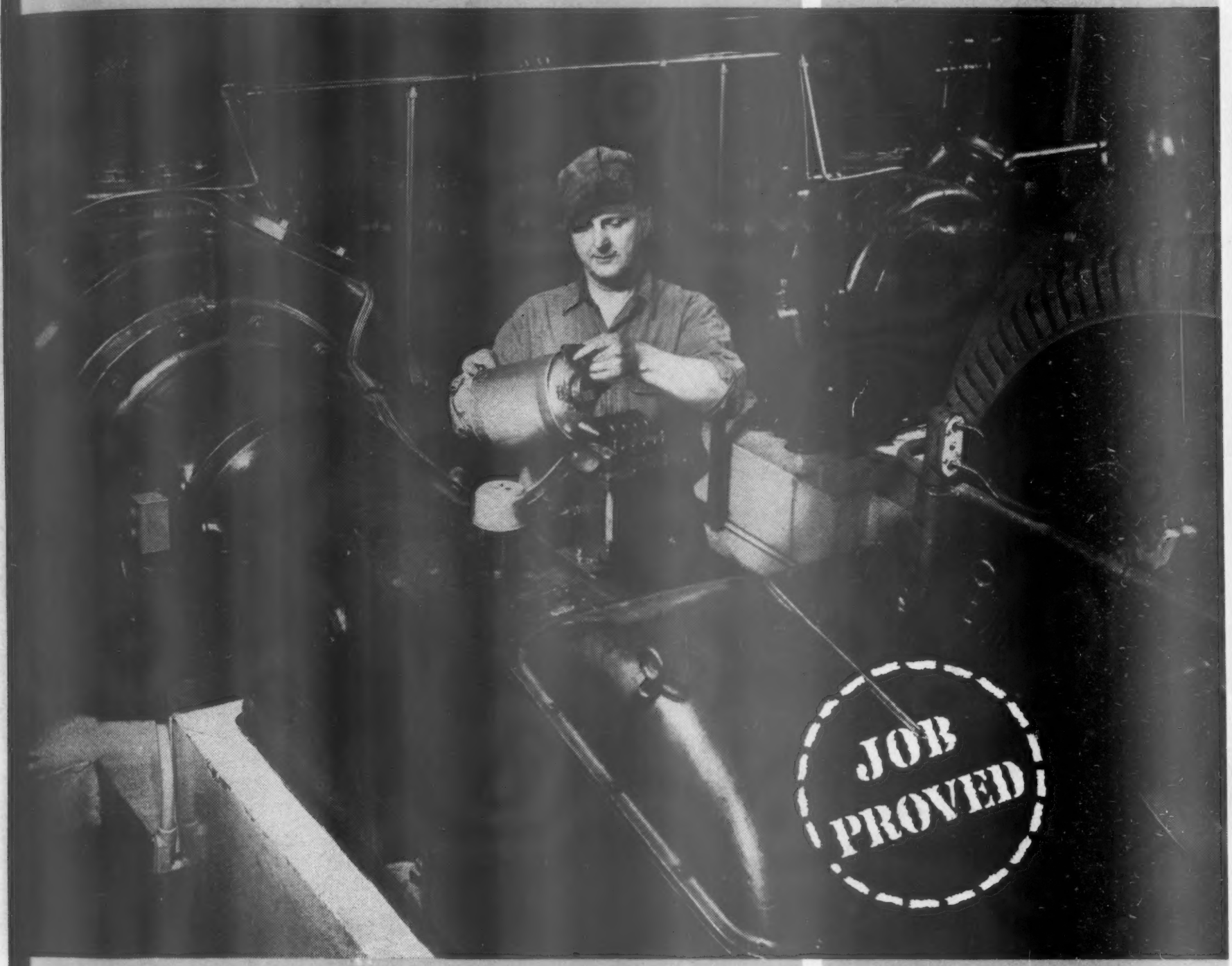


FIGURE 4. Dimension sheet for Type D flange-mounted motors, front view without feet. Where four holes (BF) are used they are 45 degrees from the horizontal and vertical center lines

Three Years Without a Shut-Down



SUN COMPRESSOR LUBRICANT . . .

Keeps Vital Unit Operating 24 Hours a Day Without Parts Replacement or Repairs of any Kind

The multi-stage, duplex air-compressor shown above operates 24 hours a day, supplying air to hydraulic presses, paint sprayers, air hammers, air grinders and automatic heating equipment.

A few years ago the customer was having considerable bearing trouble while using a well-known brand of lubricating oil. A Sun Engineer studied the operating conditions and recommended the proper Sun lubricants, "Job Proved" in dozens of similar machines.

For more than three years now, Sun "Job Proved" lubricants have been in service. Crankcase temperature has been lower. Oil consumption has been less. No shut-downs or repairs of any kind have been necessary, and inspection has shown all parts to be clean and well lubricated.

Records of this sort are being made every day by "Job Proved" Sun products in hundreds of plants. For lubricants that will give you maximum assurance of steady night-and-day operation, call your nearest Sun office or write Department F-5.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

SUN

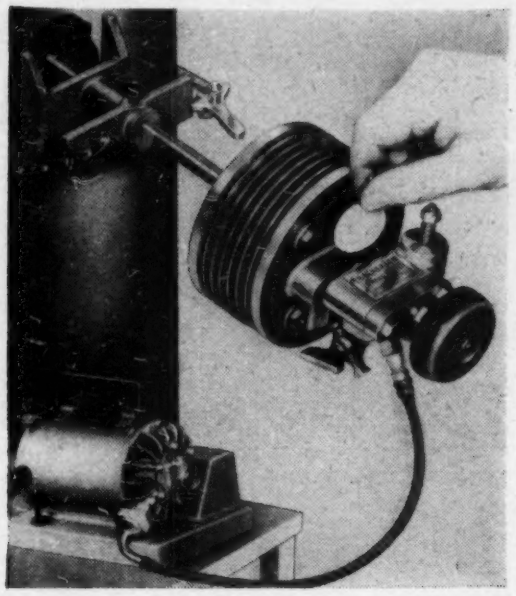
SUNOCO

INDUSTRIAL PRODUCTS

WHAT'S NEW IN EQUIPMENT

SMOKE TESTER

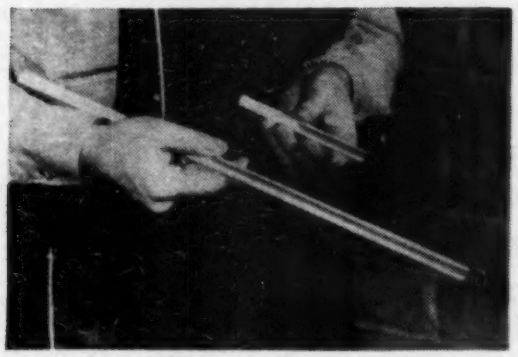
Density of smoke from the combustion process in oil-burning furnaces can be tested by an instrument consisting of a sampling unit and a motor-driven



vacuum pump. A time switch mounted on motor base automatically stops operation of motor after 1-min. interval. The sampling unit is attached to flue pipe with an adjustable strap, and pump is set where convenient to furnace. Filter disk indicates extent of smoke, and oil burner can be adjusted accordingly. Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh 8.

MASONRY DRILLS

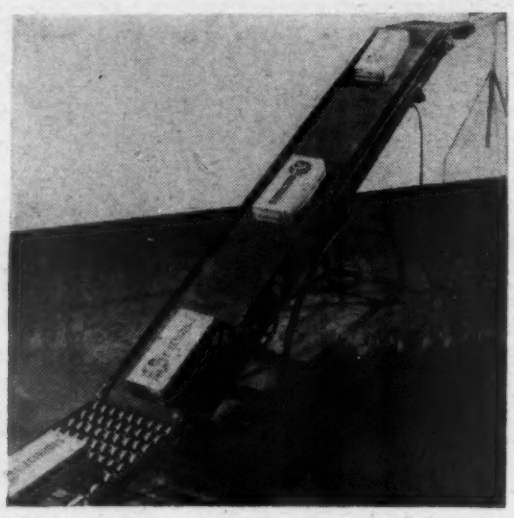
Extra-length, carbide-tipped masonry drills, for use in deep hole drilling of non-metallic materials, have been stand-



ardized. Made in sizes up to 1½-in. diameter, and 20-in. length, the drills are fluted for chip clearance and heat dissipation. Super Tool Co., 21650 Hoover Rd., Detroit.

BELT CONVEYOR

Designed to load or unload, elevate, or stack crates and containers, lightweight endless-belt powered conveyor, called Speedlift Jr., can be wheeled to locations needed. The belt table is mounted on a welded pipe supporting frame. All moving parts are guarded, excepting the



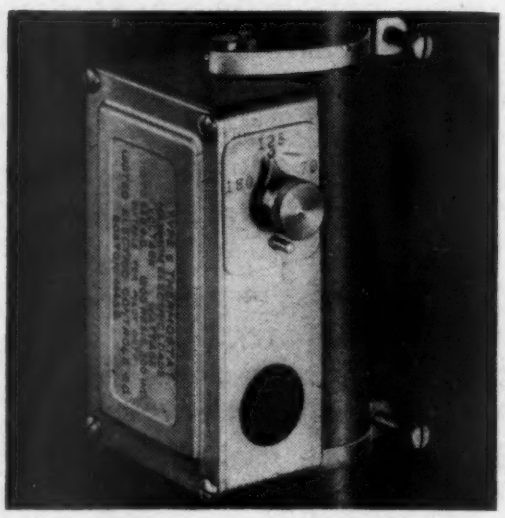
"Rufftop" conveyor belt. The unit will convey materials along a horizontal plane, or elevate them to any height up to 6 feet. Driven by a 60-cycle, 110-volt motor, it has an adjustable, reversible power-driven feeder unit. Can be connected to conveyors with universal coupling. A gravity head delivery unit with ball-bearing wheels is mounted on opposite end of conveyor. Speedways Conveyors, Inc., 1261 Niagara St., Buffalo 13, N. Y.

FLEXIBLE HOSE

Reinforced to withstand pressure of 800 p.s.i., flexible hose has been developed for use on high-pressure washing equipment. Synthetic rubber tube is compounded to resist hot water, soapy solutions, and chemicals. The hose is reinforced with two plies of Ustex, a chemically treated, high-strength textile, and cover is made of synthetic rubber to resist oil and grease. Made in ⅜-, ½-, and ¾-in. I.D. sizes. United States Rubber Co., Rockefeller Center, New York.

THERMOSTAT

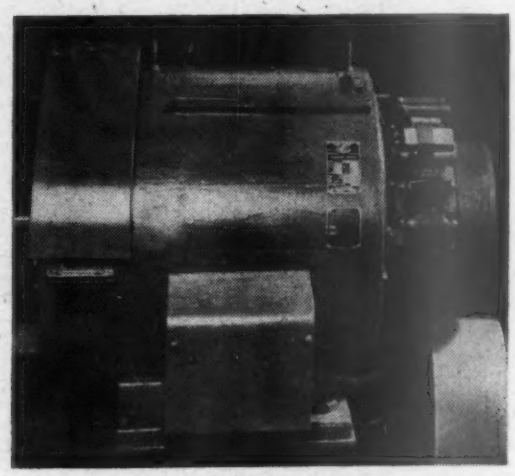
Strap-on thermostat, Type S, built for controlling water, steam, and chemical temperatures within a differential of 15 degrees, is suitable for pilot duty operation. Dial adjustment is calibrated from



40 to 210 degrees. Voltage rating is 110 to 220 a.c.; wattage is 1200 resistance, 300 inductive. Overtravel protection is provided. Adjustable clamps allow mounting on pipes of different diameters. The housing is tapped, ready to receive standard electrical connections. Three types of switch action are available—normally closed, normally open, and double throw. United Electric Controls Co., 69-71 A St., Boston 27.

GENERATOR SETS

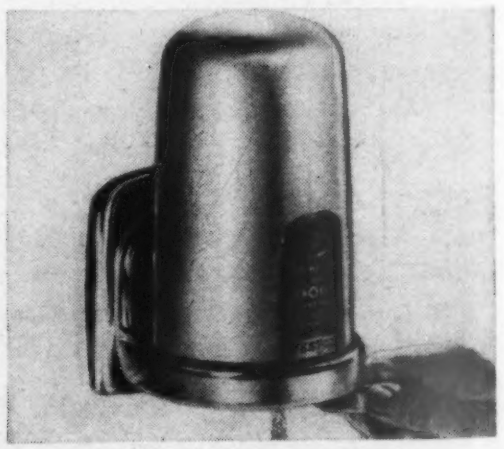
Quick-acting automatic regulation to maintain rated voltage is said to be provided by Regulectric generator sets for powering high-frequency portable tools. Ratings of the generator sets are 31.3 and



63 kva., in standard voltages of 240 or 480 at 180 or 360 cycles. The compact circuit has no moving parts and requires no maintenance or adjustment of voltage, because it operates on the principle of electrical resonance. Electric Machinery Mfg. Co., Minneapolis 13.

SOAP DISPENSER

Made of enameled cold-rolled steel, with a chrome-plated base, soap container dispenses Lan-O-Kleen, a non-caustic powdered soap containing lanolin. Al-



lows a predetermined, measured amount of soap to be dispensed with a minimum of waste and effort, maker says. Has no screw heads or other obstructions which might cause clogging. Measuring valve

"Half-inch or Thirty!"

YOU don't do much shopping around for the fittings you need when you deal with the Tube Turns distributor. He's got 'em or can get 'em for you, fast—welding elbows ranging in diameter from tiny half-inch to a mighty thirty inches, welding fittings of all types and thicknesses in a wide range of prices.

Tube Turns' complete line of TUBE-TURN welding fittings and flanges in grade A and grade B carbon steels contains more regularly manufactured items than any other line—more than 4,000! And this is supplemented by an extensive selection of items in a wide range of special metals and alloys —stainless steels, carbon moly steels, chrome moly steels, copper, aluminum, brass, monel metal, inconel, nickel, wrought iron.

Write for the name of your nearest Tube Turns distributor, and for facts about how the fittings that become part of the pipe serve others in your industry.

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District Offices at New York, Washington, D. C., Philadelphia, Pittsburgh, Detroit, Chicago, Houston, San Francisco, Los Angeles

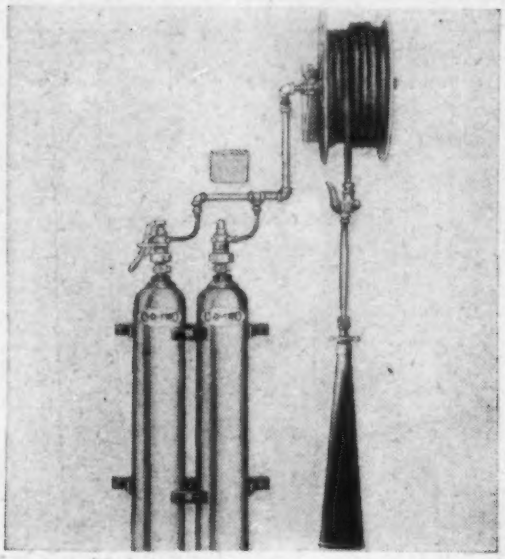
TUBE-TURN TRADE MARK **tt** *Welding Fittings and Flanges*

ONE SOURCE OF SUPPLY FOR ALL WELDING FITTING REQUIREMENTS

with agitator provides for delivery of proper amount of soap. View window permits checking amount of soap in dispenser. Dispenser adapter is available for use on Bradley fountains. West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.

FIRE HOSE REEL

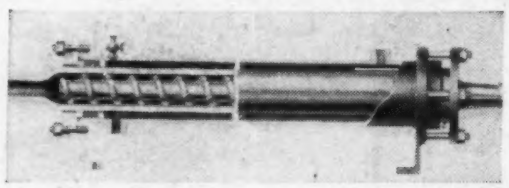
Lightweight fire hose reel of the shockproof type is available in capacities from 50 to 200 pounds or more of carbon dioxide. The stamped brass, chrome-



plated reel may be fitted with ½-in. high-pressure hose in any length up to 125 feet, or ¾-in. hose up to 100 feet. The reel and discharge horn may be installed adjacent to the cylinders or at a remote point. Nozzle handle is equipped with "squeeze-grip" valve for controlling discharge of the carbon dioxide gas. C-O-Two Fire Equipment Co., P.O. Box 390, Newark 1, N. J.

HEAT EXCHANGER

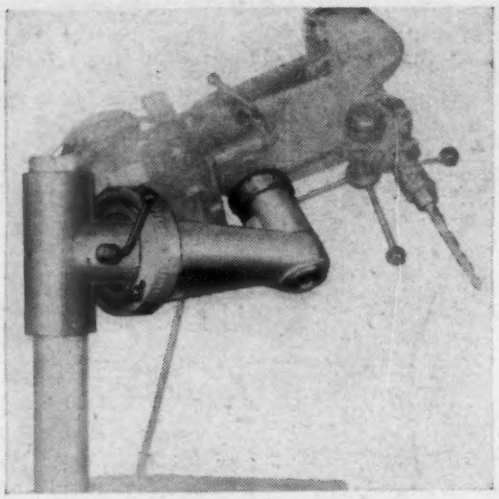
Corrosion-resisting heat exchanger features tube separation of steam or coolant from the corrosive, and vertical or hori-



zontal installation. The No. 4 size handles an acid flow of 4 to 14 g.p.m., with a heating capacity up to 155,000 B.t.u. per hour with 75 pounds steam and inlet temperature of liquid between 70 and 130 deg. F., and a cooling capacity up to 90,000 B.t.u. per hour, based on 100 deg. F. mean temperature differential. Units can be connected together in series or parallel. Parts can be removed without disturbing steam or coolant inlet and outlet connections. The Duriron Co., Inc., Dayton 1, Ohio.

RADIAL ARM

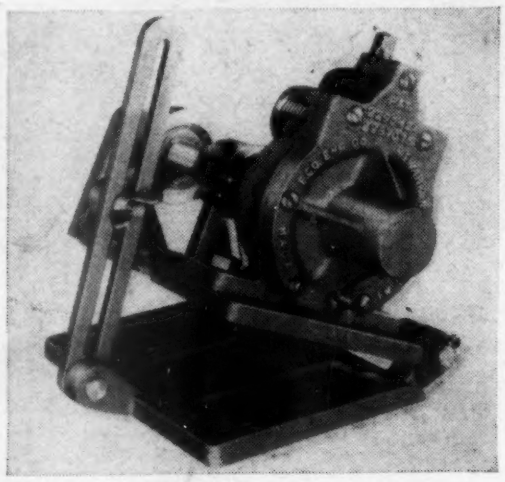
All-angle radial arm, for mounting on standard 2- to 2¾-in. column drill presses, permits drilling holes at any desired angle, and over large radius. Arm increases chuck-to-column capacity by



16 inches, and auxiliary column increases chuck-to-base capacity 5 inches; 15-in. steel or bronze auxiliary column can be furnished. The arm is clamped to base collar by bolts through a degree table graduated through 90 degrees, which permits angle adjustment of drill head. Base collar is equipped with ball-handled clamp lock for releasing or tightening two clamping wedges simultaneously, auxiliary column is clamped by two setscrews. The Empire Foundry & Machinery Corp., Ashland, Ky.

TILTING PUMP BASE

Suitable for use where pump must be engaged and disengaged, tilting pump base also provides a method of tightening a slack belt, which will hold the



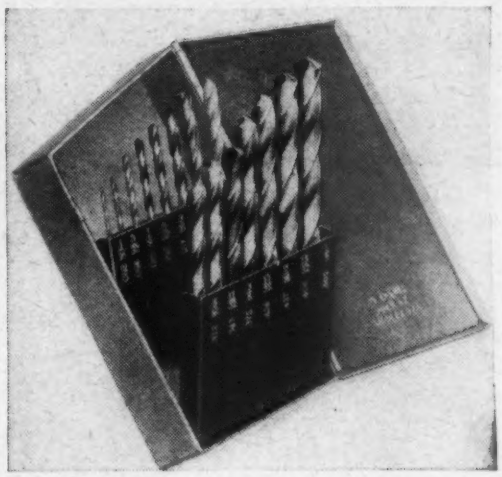
pump at any angle up to 45 degrees by means of a wing nut. It is made of bronze throughout, and incorporates a double-sealed, grease-packed outboard shaft bearing which is said to retain its lubricant indefinitely, and to assure reduced wear on moving parts of the pump by providing increased stability. The base will fit manufacturer's ½- and 1-in. single- and double-impeller gearless pumps. Eco Engineering Co., 50 New York Ave., Newark 1.

FREIGHT ELEVATOR

Electrically operated freight elevator, or dumbwaiter, has screwlift action designed for safe handling of either fragile or cumbersome loads up to 500 pounds. It is powered by a 1-hp., 1750-r.p.m. motor, which provides a lift speed of 35 f.p.m. The screwlift mechanism eliminates rails, counterweights, and cables. Includes limit switches, safety switches, door interlocks, and self-braking feature. The elevator can be installed on either a side or back wall, or under a counter, without major alterations. The standard model beam is 15 feet, giving a lift of 12 feet. Additional travel to greater height may be obtained. The Electravator Corp., 705 Albany St., Dayton 8.

INDEXED DRILL CASE

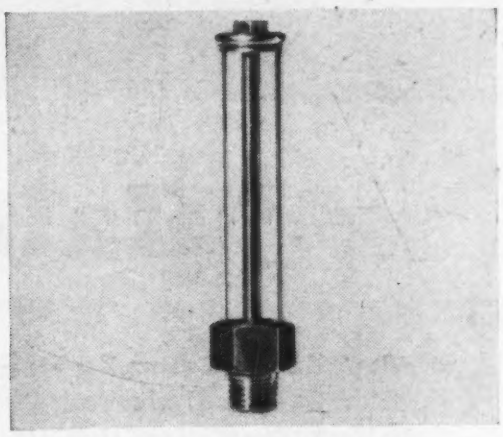
Protective case for an assortment of 15 drills is indexed in fractions of an inch as well as in decimals. It has openings



for drills from 1/16 to ½ inch, with graduations in 1/32 inch. Huot Manufacturing Co., 500 Robert St., St. Paul 1.

STRAIGHT OIL GAGES

Unbreakable plastic sights in line of straight oil gages eliminate need for protective cover, and permit full vision from all angles. Gage body is machined from hexagonal bar stock, and a heavy central



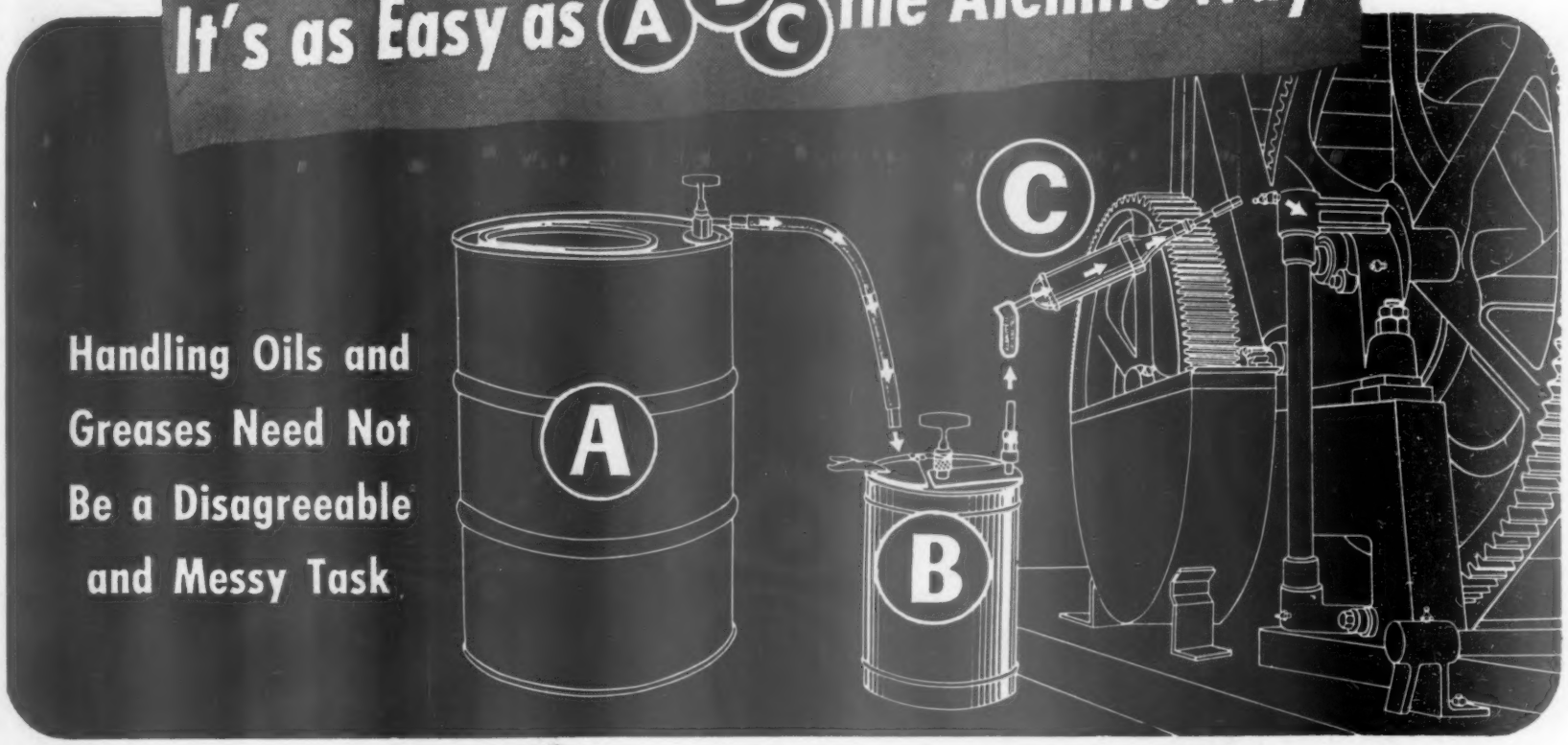
stem has top cap to support the sights. An independent nut locks the unit together, compressing the gaskets, and preventing leakage. The gages can be taken apart for cleaning by removing top nut. Standard sizes cover a gage range of 2½ to 5 inches. Gages can be furnished for special requirements or applications. Oil-Rite Corp., 3479 13th St., Milwaukee 7.

CRANE DOOR CLOSER

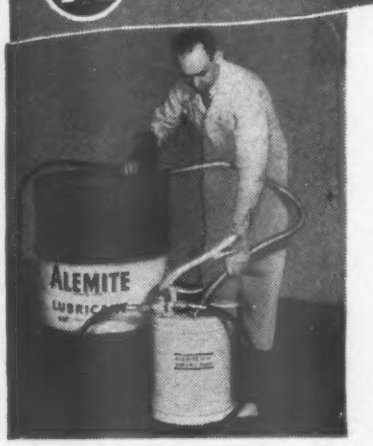
Closing of large and small swing-type crane doors is facilitated by the use of powered closing arms. A series of mechanical and electrical interlocks prevents interference with or damage to the components in the operation of the door. The motorized slide door swings up and

How to Handle Lubricants "FROM BARREL-TO-BEARING..."

It's as Easy as A B C the Alemite Way!



A Transferring



The Alemite Way, You Transfer Oils and Greases Quickly . . . Easily

◀ Alemite air operated transfer pump filling Alemite volume pump and grease gun loader

Not even the oiler's hand touches the grease or oil. There's no mess, no waste, not the slightest chance for contamination. The transfer pump can be used to fill any piece of lubricating equipment faster and more easily direct from original drums.

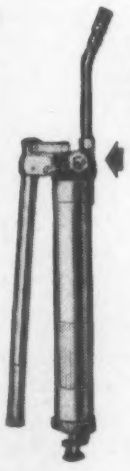
B Loading

How You Load Grease Guns Full . . . without Mess or Waste

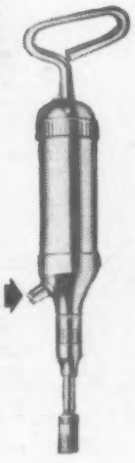
1. The Hand Gun has a special loader fitting. To fill the gun, simply insert the fitting into the loader valve on the pump. Then pump until the gun is full. No air pockets — a full gun every time.

2. You'll know when the gun is full. The loader valve automatically closes. The pump handle locks and you can't possibly overload the gun or damage the gun barrel. *And* there's no grease to be wiped off.

C Applying



New Alemite Hand Guns with Loader Fitting



Lever-Type Gun . . . a heavy duty gun with loader fitting mounted in the head. Gun is available in two models — No. 6679-E and No. 6243-E.

Push-Type Gun, the loader fitting mounted in the head. Available in two models — No. 7553 and No. 7584.

ALEMITE

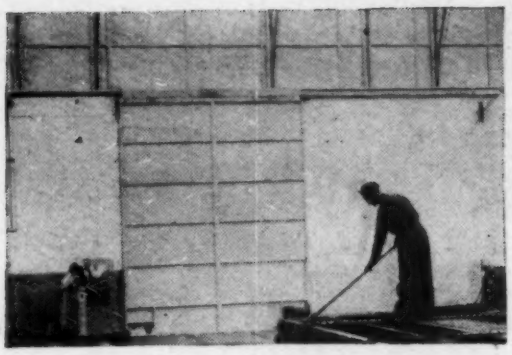
Industrial

LUBRICATING EQUIPMENT

1870 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Another Product of STEWART WARNER

ALEMITE HELPS THE WORLD GO 'ROUND



open to allow free travel of the crane between the plant and the yard, and when closed provides a weathered closure which retains the heat in the building. In use, the speed of the door is said to minimize heat loss in the plant. Fleming Steel Co., New Castle, Pa.

HYDRAULIC LIFT TRUCK

Direct gasoline powered, Series 5 hydraulic lift truck is a tiering, tilting, telescoping fork truck of 2½-ton capacity. Has front wheel drive and rear wheel steer, with three speeds forward and

three reverse, and travels up to 18 m.p.h. in either direction. Negotiates narrow aisles and roads. All hoisting and tilting operations are controlled by a single lever. There are no cylinders or chains to hamper operator's view through tower. Equipped with three interchangeable demountable cast steel wheels. Guard frame over operator and full-vision, waterproof cab are optional equipment. Seat is adjustable. The Ross Carrier Co., Benton Harbor, Mich.

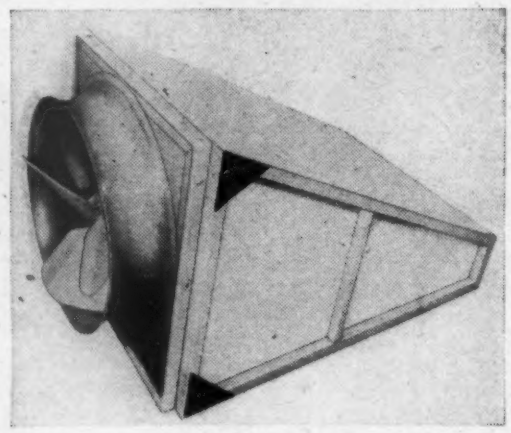
BATTERIES

Four batteries range in type from a small flashlight cell and a penlight cell to a lantern battery. The 1½-volt flashlight cell, Type No. VS033, is 1x1⅞ inches, and the penlight cell, Type No. VS034, also 1½ volts, is 9/16x1 15/16 inches. Third

is a 1½-volt ignition cell, Type VS0061S, measuring 2⅝x6 9/16 inches. The 6-volt lantern battery, Type VS040, is 2⅝x2⅝x 4 inches. The cells in the pack-type batteries are aged and tested individually before being assembled, maker says, and each battery is code marked. Radio Corporation of America, R.C.A. Victor Division, Camden, N. J.

VENTILATING UNIT

"Silent Breeze" ventilating package consists of a fan, a suction chamber, Comfortrol time switch operating 24-hour cycle, and two kinds of automatic shutters, one for ceiling and another for side-



wall installation. The shutters, of flush design, function automatically in coordination with the fan. The suction chamber provides a leakproof enclosure between the fan and the automatic ceiling shutter or grille. Rigidly constructed with metal-reinforced wood frame prefabricated in four panels, it has self-sealing joints and the panels are of sound-absorbing material. Chamber and fan, when installed, rest on vibration-damping material. Holcomb & Hoke Mfg. Co., Inc., Indianapolis.

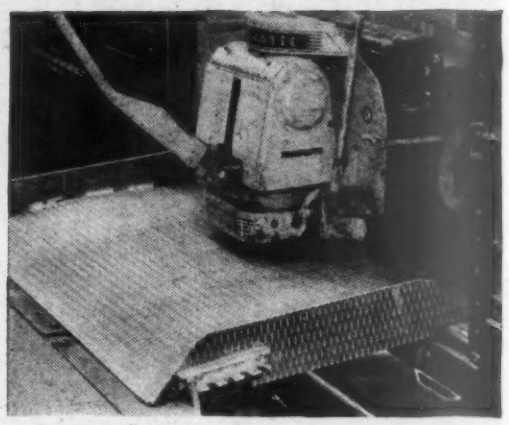
ALUMINUM LADDERS

Weighing less than 2 pounds per foot of height, Amplex aluminum ladders can be moved easily from place to place. Each step is built to withstand 500

pounds working load, while the entire ladder has been tested up to 1200 pounds, maker states. Work shelf holds toolboxes and other heavy objects. Equipped with rubber mats on top step and work shelf, rubber guards on feet. Jarvis Mfg. Co., Glendale 1, Calif.

METAL BRIDGE RAMPS

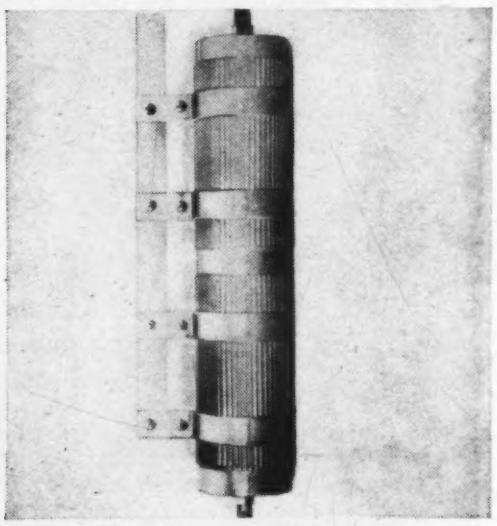
Lightweight metal bridge ramps incorporate independent positive locking devices on each side of the ramp, with



sufficient range adjustment to position the ramp securely. High side guards prevent injury or accident to operator, equipment, or load. One man can lift and position the ramp without undue strain. It is crowned to compensate for different levels between car, dock, and trucks. Diamond Safety plate prevents skidding, and ramp is heavily trussed underneath for loads of maximum capacity. Pallet Engineering Co., 625 Second St., San Francisco 7.

SELENIUM RECTIFIER

Constructed in standard unit elements, selenium rectifiers are cylindrical in shape, with circulating liquid cooling for maximum heat dissipation. Assemblies can be made in the number needed for the output in amperes and voltages re-



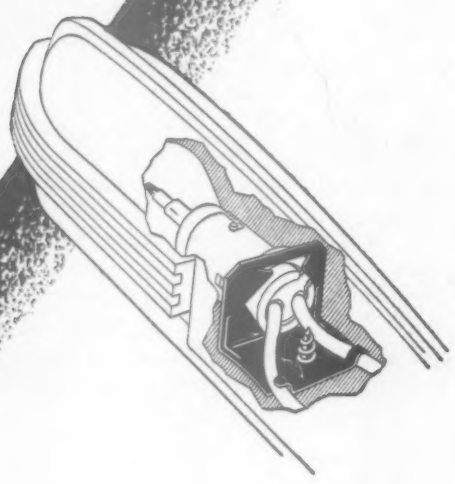
quired—connecting in series or in parallel—in capacities from 250 amperes of the standard single element, to assemblies for large scale operation. Hermetical seal of the active surface area is designed for long-life, trouble-free operation. The standard S-300 unit has a rating of 250 amps. continuous, 500 amps. intermittent. Ion Industries, Inc., 600 West 138th St., Riverdale, Chicago 27.

V-BELT PULLEY

Adjustable, variable pitch V-belt pulley locks on shaft with a spiral wedging action. No setscrews are used, and no threads or keyways are required on the shaft. The pulley is in rigid alignment

This is a SPEED NUT*

and



THIS ..is also a Speed Nut!

Take a look at this *one* SPEED NUT that does *three* jobs. Conceived by our development engineers to simplify automotive parking lamp assembly, it retains light socket, spaces wires and fastens entire assembly to the base. (See sketch). It replaced four separate parts and eliminated three machining and welding operations.

This is but a typical example of the SPEED NUT Savings Factor. So flexible is the basic SPEED NUT principle, it can be incorporated in almost any conceivable shape to improve your product, speed up your assembly, reduce the number of parts and cut costs. We can give you a no-charge fastening analysis that may surprise you. Send in your assembly details today.

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Speed Nuts* PATENTED

MORE THAN 4000 SHAPES AND SIZES

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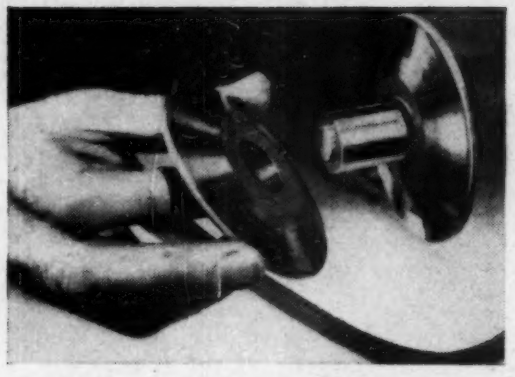
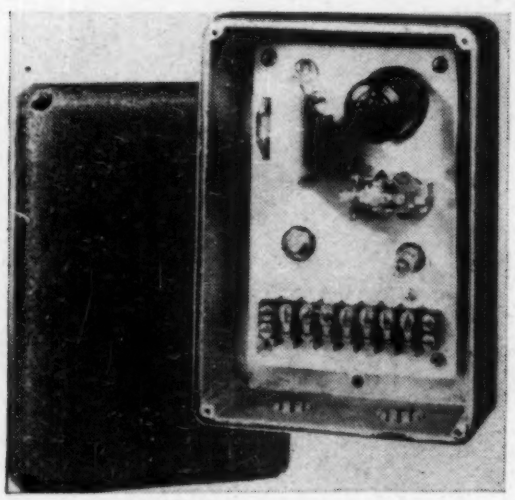
FASTEST THING IN FASTENINGS



when locked in place, and adjustments may be easily made. Will drive in either direction of rotation. The Spiralok pulley is adaptable for use with air conditioning, refrigerating, and ventilating equipment; air compressors; conveyors; machine tools; motor-driven pumps; and other motor-driven, V-belt connected apparatus. Scientiae Corp., 103 Pine St., Dayton 3.

ELECTRONIC RELAY SWITCH

Operation of electronic relay switch is said to be possible on the condensation of moisture between two points located close together, on a column of mercury such as a contact type thermometer, or on any conductive liquid such as milk,



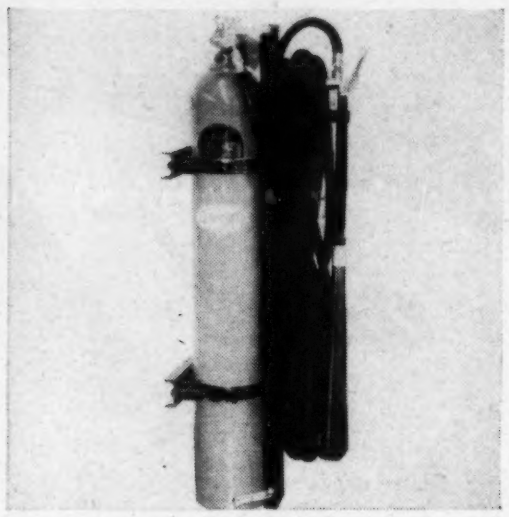
chemicals, or distilled water. Built for mounting in a cast aluminum case 5x7x3½ inches, it can also be furnished without the case, for installing in existing equipment. It may be placed any distance from a control probe or point, because only one wire and normal grounding are required. Sensitivity control, adjusted with screwdriver, provides probe resistance range of 5000 ohms to 7 megohms. Special Products Co., Silver Spring, Md.

METAL REPAIR COMPOUND

Repairing leaks and plugging up holes in pipes, radiators, furnaces, and boilers, a compound, for use on all metals, is composed of metals in powder form combined with a liquid. The powder and liquid, when mixed, form a smooth paste which is applied to the crack or leak without fire or heat. In a few minutes it is as hard as the metal itself, manufacturer says, and expands or contracts under different temperatures with the metal to which it is applied. Claimed to be proof against steam, heat, pressure, to be waterproof, and to resist gasoline, oil, and most chemicals. Metalon Mfg. Corp., Bayonne, N. J.

FIRE HOSE RACK

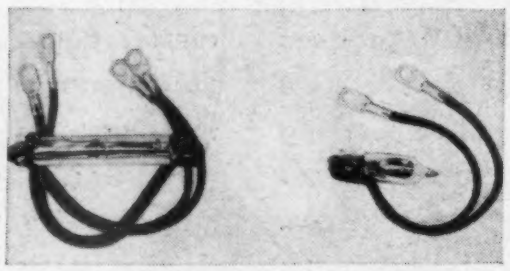
Carbon dioxide hose rack for firefighting may be used as a fixed unit, or may be picked up and carried to a fire. Cylinder bracketing, permanently fastened to



a wall or column, has quick-opening clamps to permit removal from fixed position, and four handles are provided. The cylinder contains 50 pounds of carbon dioxide, and is fitted with 25 feet of ½-in. high-pressure hose, terminating in a discharge horn with "squeeze-grip" valve. The unit weighs 240 pounds, is 57 inches high, and requires 11x21-in. floor space. C-O-Two Fire Equipment Co., P.O. Box 390, Newark 1, N. J.

MERCURY SWITCHES

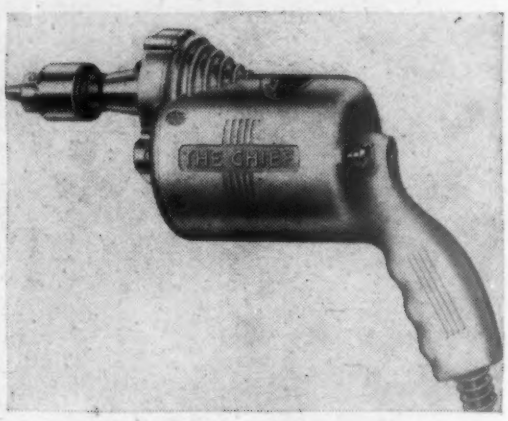
Hermetically sealed mercury switches are unaffected by moisture, dust, corrosion, or oxidation, the manufacturer states, and provide safety in hazardous locations because open sparking or arc-



ing is eliminated. Contacts remain clean, and cannot pit or burn. Quick make-and-break action is provided, and any contact arrangement can be furnished, including polyphase types. The lightweight switches can be incorporated in most types of equipment requiring positive switching. Multiple contact types can be supplied in a single unit for simplified mounting. Chatham Electronics, 475 Washington St., Newark 2, N. J.

PORTABLE ELECTRIC DRILL

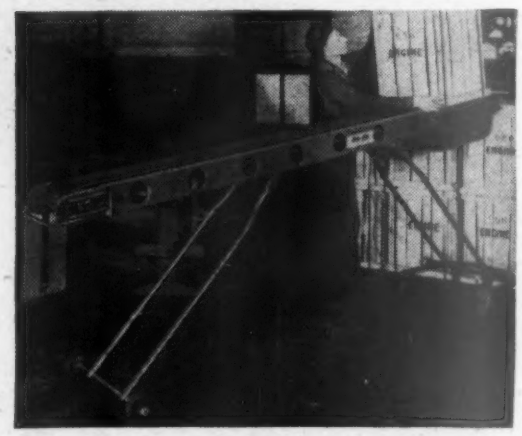
Weighing 3¾ pounds, portable electric drill, named The Chief, Model 63, is suitable for general duty use. It penetrates up to ¼ inch in steel, and up to ½ inch in wood. Equipped with three-jaw Jacobs chuck with key, fingertip switch,



pistol grip, 12-ft. cable of rubber, and free speed of 2000 r.p.m. Operates on 110-volt a.c.-d.c. Chicago Precision Machine Co., 920 South Michigan Ave., Chicago 5.

PACKAGE CONVEYOR

Lightweight portable power conveyor, known as Model P-10-8-½ Tote-All Packaged Material Zephyr, handles bags, boxes, crates, cartons, and other packaged material. Made of corrosion- and abrasion-resistant alloy steel, the 10-ft. model weighs 291 pounds complete with



power unit and undercarriage. Can be moved by one man to different jobs. Powered by electric motor coupled direct to gear reducer. Rear wheels of undercarriage are solid, and front wheels are swivel casters. Either end of the 10-ft. model may be raised to 6 feet. Material Movement Industries, 310 South Michigan Ave., Chicago 4.

WELDING ELECTRODE

Designated W-2075, electrode for welding cast iron is composed of pure nickel core wire and an extruded black covering which is largely consumed in the arc and produces little slag. The arc stabilizing ingredients in the covering permit use on a.c. and d.c. The electrode may be used in all welding positions. The nickel deposit eliminates the hard zone, and, although the composition of the deposited metal is different from the cast iron, welds are not readily detected on machined surfaces, according to the manufacturer. Electric Welding Div., General Electric Co., Schenectady 5.

TEST PLUGS

Pressures up to 100 p.s.i. in tanks, boilers, or other receptacles, can be tested by means of Hydro-Matic test plugs, which form a leakproof seal. The lightweight,

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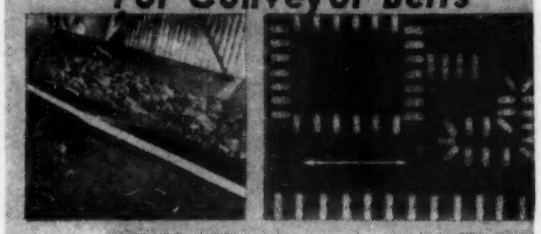
Present Day Practice in Belt Fastening

Every man who has anything to do with the purchase, application or maintenance of conveyor, transmission or V-belts will find the bulletins listed below of considerable value in connection with belt fastening work. A knowledge of present day practice in belt fastening helps reduce the loss in machine hours due to belt failures caused by the use of the wrong type of fastener or improper application. We shall be glad to send any or all of them to you or to any of the men in your organization.

For Conveyor Belts



FLEXCO HD Belt Fasteners are used to make a "water-tight" butt joint in conveyor belts ranging from ¼" to 1½" thick and of any width. The view on the right shows the various types of rips that can be repaired with these fasteners and Flexco HD Rip Plates.

Bulletin F-100 gives complete details on how to fasten and repair conveyor belts.

For V-Belts

ALLIGATOR V-Belt Fasteners are now being widely used to fasten B, C and D, open-end V-belting of cross woven fabric core construction now being made by most belting manufacturers. The view at the left shows a typical application of these fasteners to a drive where endless V-belts would require dismantling the machinery to put the belts on the sheaves.

Bulletin V-205 gives complete instructions on how to use V-belt fasteners.

FLEX V Fasteners for A and B belts are also available for lighter duty V-belt drives. Ask for **Bulletin V-14.**

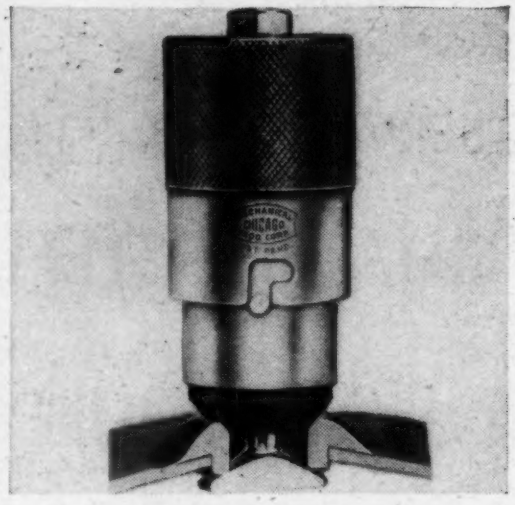
For Transmission Belts

ALLIGATOR Steel Belt Lacing is in world-wide use to make smooth, flexible joints in leather, rubber, balata, stitched canvas or solid woven belts up to ⅜" thick and as wide as they come.

Bulletin A-60 tells how to fasten and repair transmission belts.

Sold by Supply Houses Everywhere

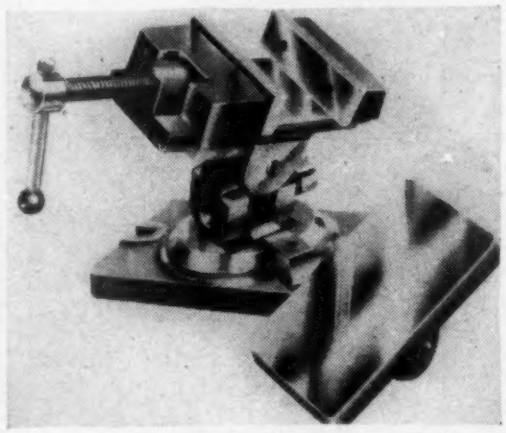
FLEXIBLE STEEL LACING COMPANY
4678 Lexington Street, Chicago 44, Ill.



rustproof plugs are adaptable to any type of spudded, flanged, or drawn openings, either plain or threaded, from ⅛- to 4-in. sizes. Other models are available for pressures up to 500 p.s.i. Mechanical Products Corp., 168 North Ogden Ave., Chicago 7.

VISE AND WORK TABLE

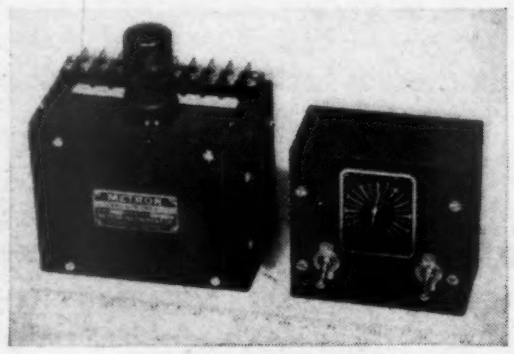
Multi-angle vise and work table can be used for small manufacturing and assembling jobs, light drilling and grinding, repair work, welding, and similar applications. Castings are semi-steel, and the unit has a 360-deg. swivel base.



Equipped with interchangeable and reversible hardened machine steel vise jaws 3 inches wide, 1 inch high, and opening 2 inches. Table is 4x5 inches, and base 4x6 inches. Vise and work table tilt 45 degrees or more. Manufacturer's Engineering Service, 454 Security Bank Bldg., Toledo 4.

WELDING TIMERS

Timing intervals from 1/60 second up to several minutes can be provided in one or several continuously variable ranges by small welding timers. Adjustability by steps, or fixed interval timers



are also available. Accuracy is said to be high, and substantially unaffected by wide variations in line voltage or temperature. Control box, 4x4x2 inches, can be mounted with bracket, or incorporated in machine by flush mounting, with the timer box placed anywhere out of the way, or control box can be screwed to timer box. Equipped with one tube and two relays, the electronic-type timer has no mechanical components. Metron Instrument Co., 432 Lincoln St., Denver 9, Colo.

STRADDLE TRUCK

Sloping hood on Model MH straddle truck permits driver visibility. Hoist

mechanism is designed for ease of operation. The truck has a capacity of 30,000 pounds. Hyster Co., Portland 8, Ore.

TORQUE TESTER

Power tools can be tested and adjusted with the Model SDB-25 beam scale, which also checks the accuracy of torque screwdrivers, torque wrenches, and other torque tools. Claimed to be accurate to

a fraction of an inch-pound, the unit has a standard capacity up to 25 inch-pounds, which can be varied by increasing or decreasing the regulating weight. Various adapters are made to suit special applications, and larger measuring instruments can be supplied. Airdraulics Engineering, Inc., New Canaan, Conn.

MACHINE TOOL LIMIT SWITCH

Snap switch, designated Class 9007, Type AW, is available in oiltight, dustproof enclosure suitable for machine tool limit switch applications. A small self-contained contact mounted in a gasketed die-cast enclosure is said to increase electrical rating and mechanical life, and to reduce size of the unit. Surface or flush mounted, it may be obtained with either roller arm or push-rod operated mechanisms. The ½-inch conduit en-

WHAT ARE THE MAXIMUM WORKING PRESSURES FOR HYDRAULIC CONTROL AND GREASE HOSE?

YOUR THERMOID CATALOG* WILL SHOW!

No matter what job you have for hydraulic control or industrial grease hose, Thermoid can place on your desk up-to-the-minute facts on sizes, working pressures and—availability! You can find immediately the size and structure you will need for the job you have to do.

We can also tell you—

That Thermoid hydraulic control and grease hoses are built with ample strength to do the work of rigid pipe, but without costly fitting, and with far greater flexibility. We can tell you exactly how they are lined and covered with materials that resist deterioration from contact with hydraulic oils and grease, reinforced to handle tremendous pressure, and designed to minimize volumetric and lineal dimensional changes.

Here's something about Thermoid too—

Thermoid concentrates its manufacturing for industry on the well integrated line shown below. The Company itself, while large enough to be thoroughly reliable, is still small enough to keep active contact with customers and their problems. That's one of the reasons why—

IT'S GOOD BUSINESS TO DO BUSINESS WITH THERMOID!

Thermoid Products
AUTOMOTIVE • INDUSTRIAL
OIL FIELD • TEXTILE
THERMOID COMPANY, TRENTON, N. J., U. S. A.

THE THERMOID LINE INCLUDES: INDUSTRIAL BRAKE LININGS AND FRICTION PRODUCTS • TRANSMISSION BELTING • F.H.P. AND MULTIPLE V-BELTS AND DRIVES • CONVEYOR BELTING • ELEVATOR BELTING • WRAPPED AND MOLDED HOSE

*A post card or a letter to the factory will bring one to you. If you buy coupled assemblies complete, ask your coupling manufacturer.

Manufacturers of new equipment are invited to correspond direct with the home office.

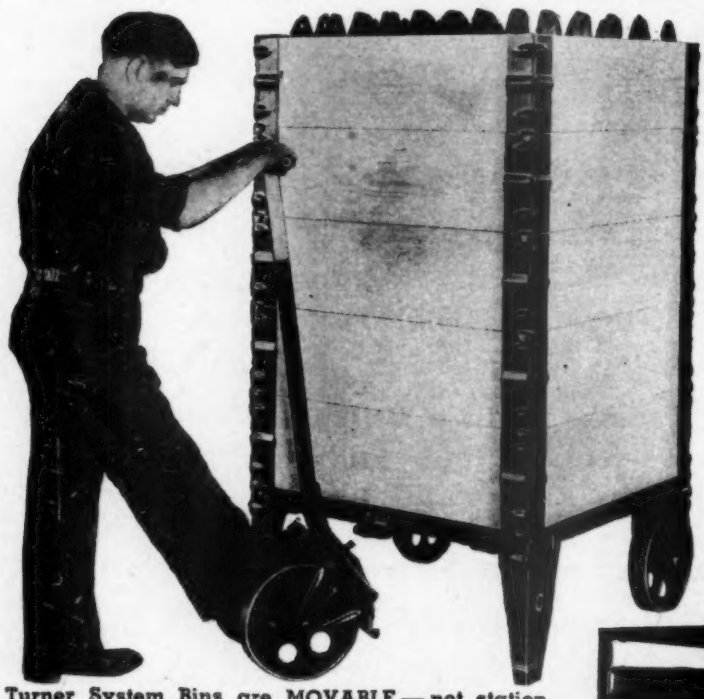
Thermoid
INDUSTRIAL RUBBER PRODUCTS
BUILT FOR THE JOB
QUALITY VALUE SERVICE

Movable Die Racks on Turner Transports.

YOUR MEN PRODUCE MORE with

THE TURNER SYSTEM

OF MATERIALS HANDLING



The standard units of the Turner System permit the establishment of uniform loads and methods of piling most convenient for the operators. Instant mobility of loads on every job avoids loss in machine time and production. More material is concentrated within easy reach of operators, saving time in every operation.

The Turner System has cut labor, space and equipment costs up to 50% for many American manufacturers. You owe it to yourself and to your company to find out what it can do for you.

Turner System Bins are MOVABLE — not stationary. Easily moved on the Transport by hand Jimmy, power lift truck, crane or tractor. Racks, Trays and Die Tables also fit on the Transport.

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WriteToday for:

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Movable Shelf Racks put things in order, provide vertical and horizontal expansion for proper storage.

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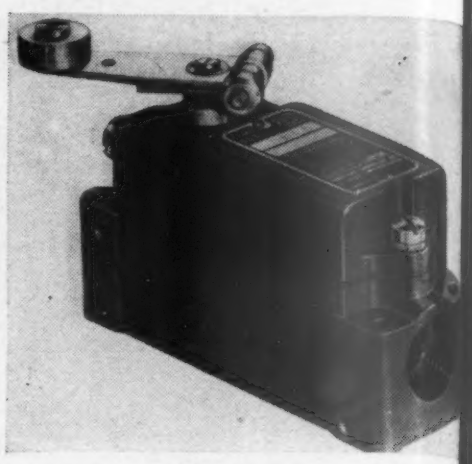
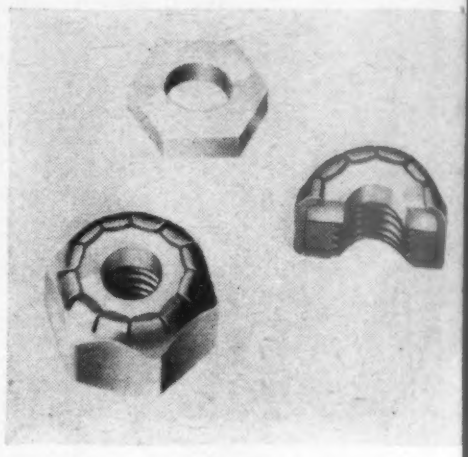


trance can be made accessible at eith end of the box by rotating cover a switch assembly 180 degrees. Square Co., Industrial Controller Div., 40 North Richards St., Milwaukee 12.

LOCKNUT

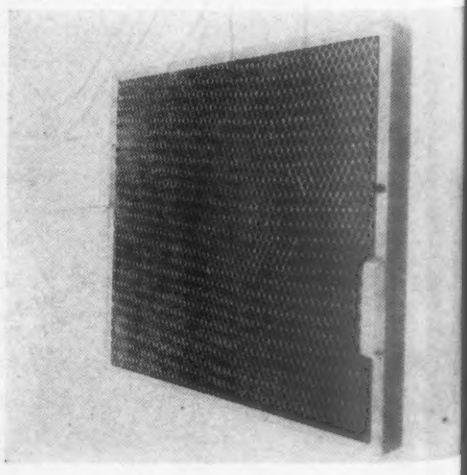
Self-locking nut, using molded nyl as the locking element, is now on t market. According to the manufacture 200 removals fail to reduce its torq



below requirements. The nylon claimed to have high elasticity, and be unaffected by gasoline, oil, mild aci esters, alcohols, or caustics. The Nyl Corp., 475 Fifth Ave., New York 17.

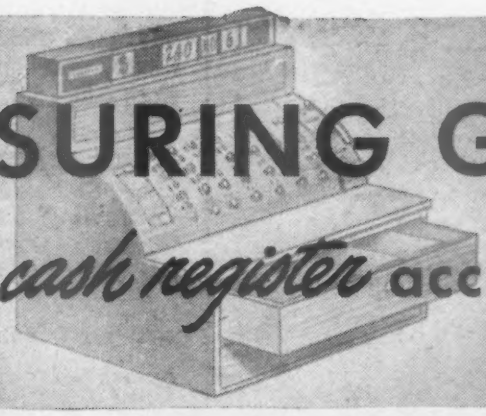
AIR FILTERS

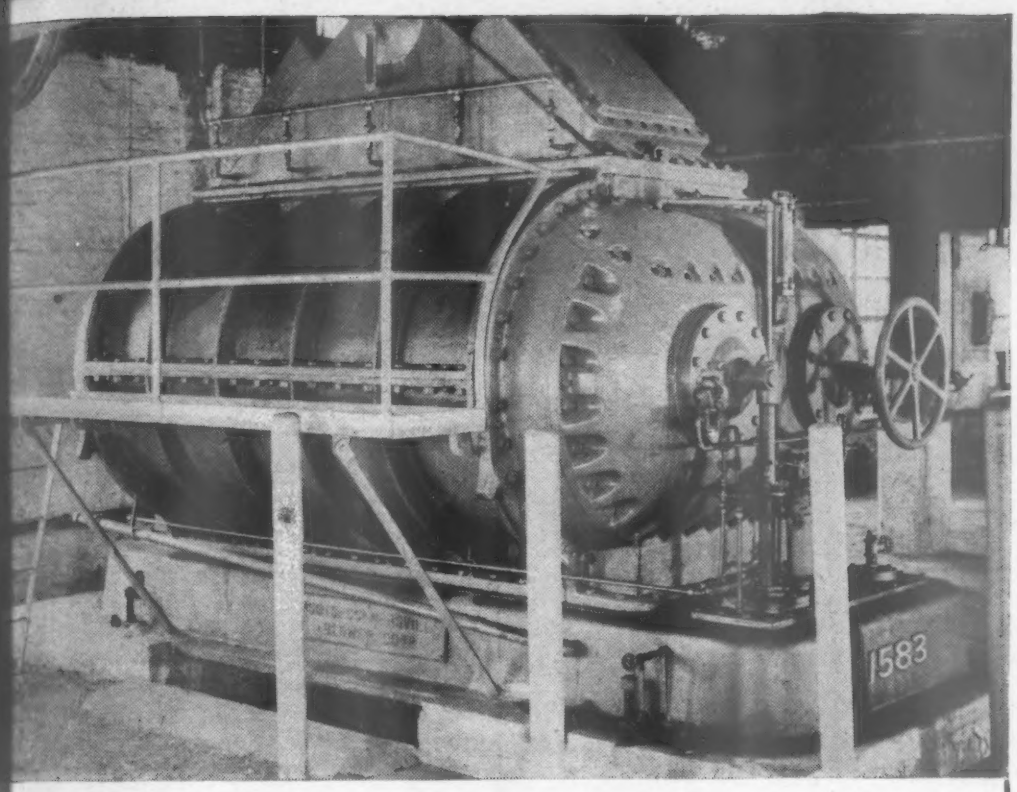
High velocity Agitair Type FM perma nent, cleanable air filters consist of laye of expanded metal disposed to indu turbulent cyclonic action of the air the filter, thereby creating a centrifug wiping action against all viscous surfac of the media. Filter frames are welde and provided with drain holes. Designe for a minimum dust-holding capacity 750 grams at 350 f.p.m., or 1000 grams



MEASURING GAS

calls for *cash register* accuracy





You'll get just that kind of accurate measurement with Roots-Connersville Positive Displacement Meters. That's because:

1. Accuracy is not affected by variations in specific gravity, rate of flow, pulsation, moisture or impurities.
2. Accuracy does not depend on uncontrollable factors.
3. Accuracy is not subject to adjustment of meter or recorder by operators.
4. Accuracy is not affected by reasonable overloads.
5. Accuracy is permanent because measuring chambers are surrounded by precision-machined cast-iron surfaces.

Other advantages of R-C Meters include: negligible operating cost, small space requirements and continuous, dependable performance.

For accurately measuring production, consumption or delivery of gas and for interdepartmental accounting, you can count on the cash-register accuracy of Roots-Connersville Positive Displacement Meters. For detailed data, ask for Bulletin 40-B-14—free, of course.

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705 Central Ave., Connersville, Indiana

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If your business calls for moving gas or air at moderate pressures, we can plan and supply your equipment. Many sizes and types of standard units are available. For special applications, our engineers are alert to every means of giving you the best results for the money invested.

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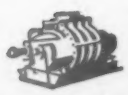
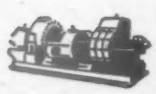


Rotary Positive Blowers are available in capacities from 10 CFM up. Simple design and construction free them from maintenance troubles. Many types and sizes are available for built-in or separate applications.



Rotary Positive Gas Pumps are widely used in handling of CO_2, SO_2 and other gases, both natural and manufactured. Capacities from 10 to 50,000 CFM.

Positive Displacement Meters for accurately measuring gas or air. Fitted with many types of recording instruments. Capacities from 1,000 to 1,000,000 CFH.

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INERT GAS GENERATORS_____
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TITLE_____

ROOTS-CONNERSVILLE
ROTARY CENTRIFUGAL
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Change to McCaskey Tool Control and you will save in a dozen ways—save tools and the time of both employees and machines.

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1. Repaid cost many times over—vital factor in success of tool division;
2. Requirements by departments cut to minimum—more production with less tools;
3. Inventory loss held to fraction of 1 percent—losses almost negligible;
4. Hoarding of tools discouraged;
5. Clearance time for transferring or terminating employees cut to minimum—invaluable in placing responsibility for tools;
6. Serviceability of various types of tools compared—loss and breakage checked;
7. Readily adaptable to varied manufacturing needs;
8. Swift and accurate inventory of all tools by depts.; tool costs readily available;
9. System immediately operated by untrained and inexperienced employees.

Whether you have one or several cribs for production or maintenance work, McCaskey Control will cut your tool costs and prevent production delays. Write for a reprint of Mr. Reagan's article, "Flexible Tool Control Repays Costs Many Times Over," and similar reports of cost-reduction and improved operations in other well known plants.

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PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

432 f.p.m. Standard sizes are 16x20, 16x 20x20, and 20x25. Air Devices, Inc., East 42nd St., New York 17.

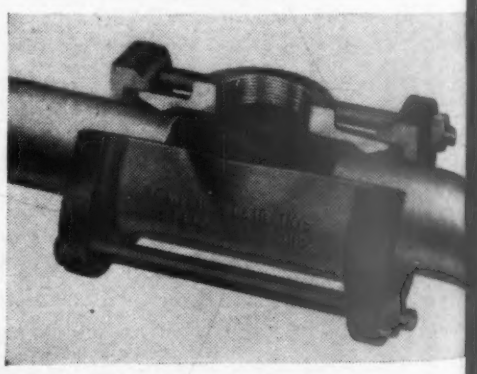
DUST MASK

Combining facial and respiratory pro tection against dusts, without obstruc ing vision, the Fulface mask is light weight, flexible, and durably con structed. Headbands are adjustabl

Offering low breathing resistance, twi throw-away filters are encased in alumi num containers placed low at the side of the mask. Rubber exhalation valv facilitates breathing and drainage o moisture. A large single clear plastic len permits wide-angle vision, and rubbe deflectors direct incoming air over th inside surface of the lens, preventin fogging. Mine Safety Appliance Co Braddock, Thomas, & Meade Sts., Pitts burgh 8.

FLEXIBLE TEE COUPLING

Flexible tee coupling connects laterals t existing pipelines without need for fiel threading in the trench. Available fo 2-in. cast iron, standard, and O.D. pip



and for other sizes as small as ¾ inch In each, outlet is same nominal size a pipe run, but has standard threads whic permit use of bushing where needed Smith-Blair Co., South San Francisco.

PNEUMATIC WHEEL

Detachable rim on pneumatic whee makes it possible to change tires in les than one minute, according to the manu facturer. Tagged Model No. PW-1642, th wheel is cast of corrosion-resistan aluminum alloy, and has two section One includes the bearing carrying par of the wheel and one rim; the other, th detachable rim which slides into positio

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...replace with RCA Electron Tubes

The RCA line of thyratron and ignitron tubes meet all major welder-control requirements. They are directly interchangeable with other standard types.

RCA thyratrons and ignitrons embody the ruggedness, high quality, and long service life that should be expected from tubes designed expressly for continuous-duty applications in industrial service. That is why you can count on *all* RCA industrial electron tubes to give top efficiency.

In addition to its representative line of thyratrons and ignitrons, RCA has a large and growing family of industrial electron tubes of which there are over 200 *standard* types. Included in this group is a complete line of high-vacuum and mercury-vapor rectifiers for high- and low-voltage applications, power amplifiers for electronic heating equipment, cathode-ray tubes, and the most complete line of phototubes in the field.

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TUBE DEPARTMENT

RADIO CORPORATION of AMERICA

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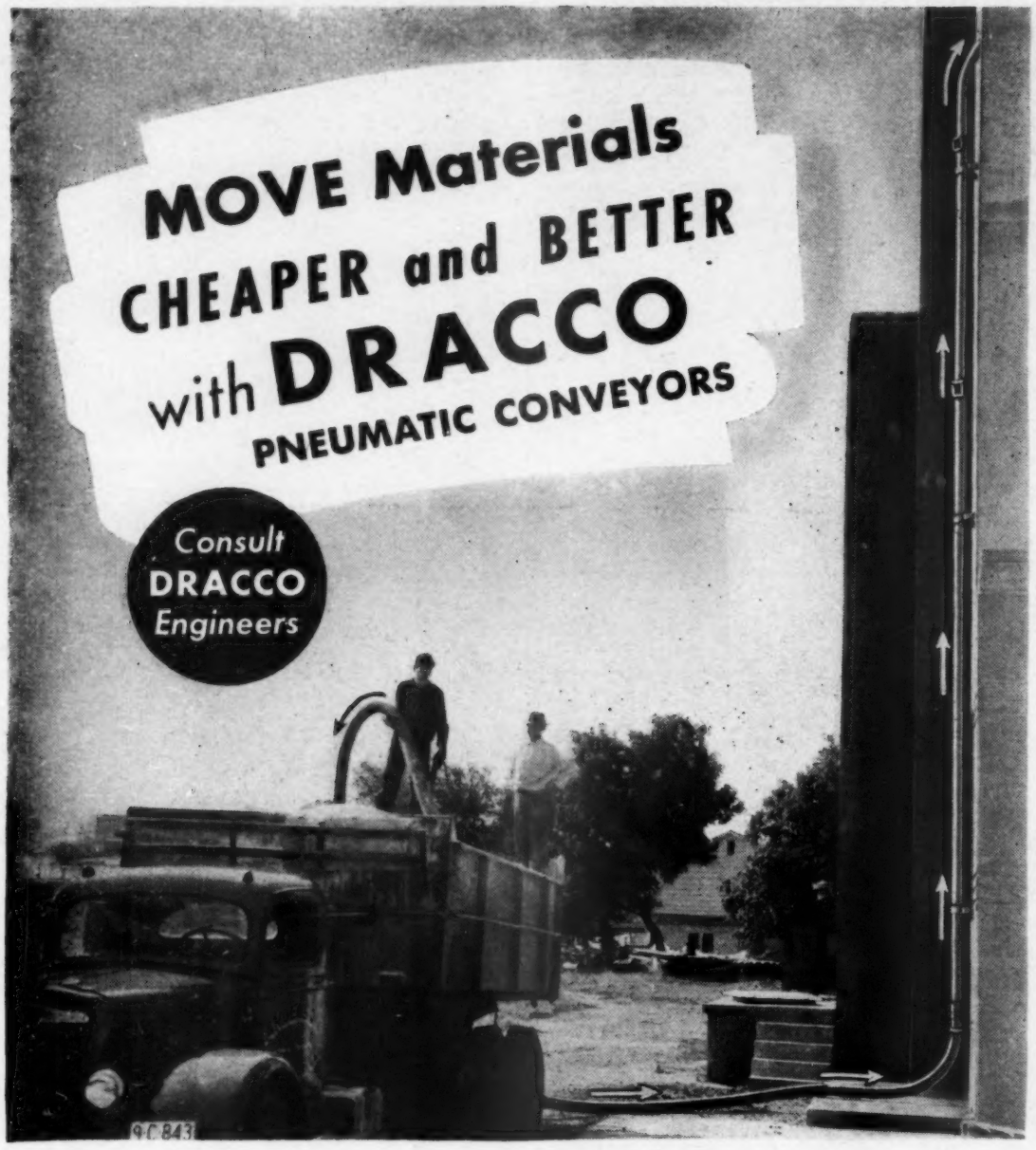

Experience over a period of many years has proved that chemicals, grains and granular materials can be handled CHEAPER and BETTER by DRACCO Pneumatic Conveyors. There's a big saving in labor because ONE man and a DRACCO Pneumatic Conveyor can do the work of SEVERAL men . . . and do it better. In the efficient handling of materials DRACCO Engineers have had more than 30 years of experience. Why not let them check your present material handling methods?

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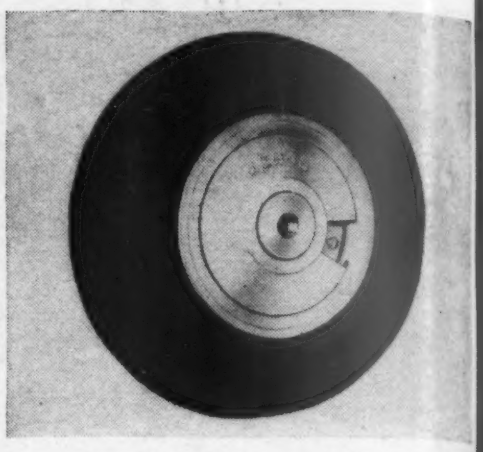
DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION



over the main part of the wheel and is held in place by a steel spring retainer ring. No tools are needed to install or change a tire, and removal of the wheel is unnecessary. The wheels are made in 1½-, 1-, and ¾-in. axle sizes, with standard hub diameter. Aerol Co., 1823 East Washington Blvd., Los Angeles 21.

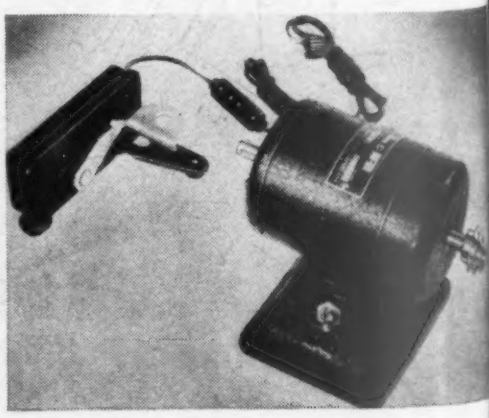
PIPEFITTINGS

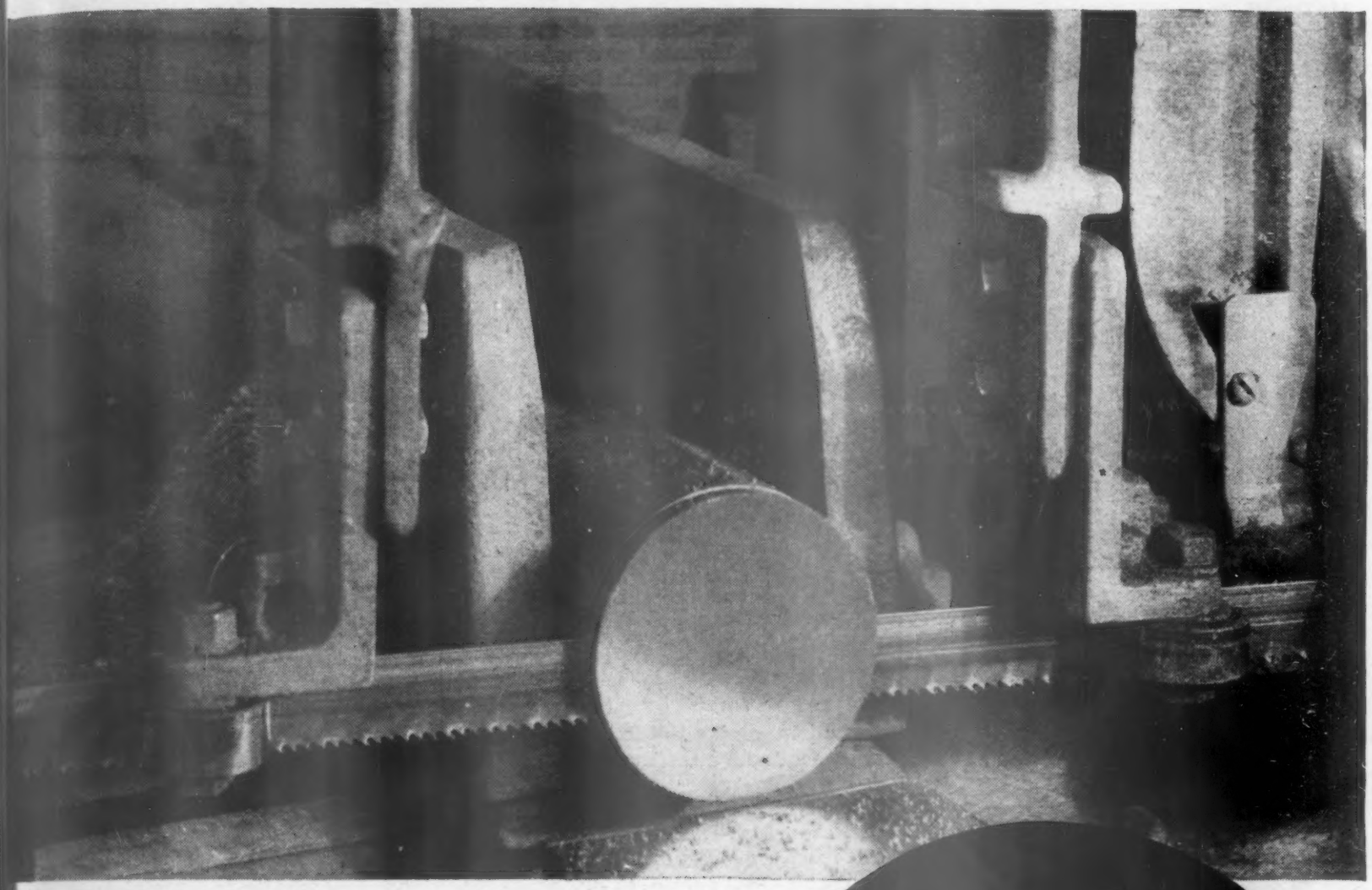
Seamless welded pipefittings of carbon steel consist of 90- and 45-deg. elbows, 180-deg. return bends, straight and reducing tees, concentric and eccentric reducers, caps, lap joint stub ends, sad-

dles, shaped nipples, crosses, and tees, in sizes up to 30 inches. Features claimed are uniform wall thickness, accurate circularity, full effective radii, smooth inner walls, machined bevel-ends, and improved metal structure. Center sections and crotch in tee design are reinforced, the metal tapering off to nominal pipe size at the ends. Full length branch outlets facilitate welding. Ladish Co., Cudahy, Wis.

GENERAL-PURPOSE MOTOR

Rated 1/10 horsepower at 5000 r.p.m., general-purpose universal motor features a spindle with ⅜-in. shaft extending in both directions, and double shielded ball bearings which require no





Climb on the SIMONDS BAND-SAW WAGON"

Save Thousands of Hours by Band-Saw Cutting . . . instead of Shaping, Milling, Turning, Drilling

Getting to be a "Big Parade" . . . the ay shops are swinging to metal band-sawing . . . and eeping their one-purpose machines free to do the ork for which they were designed.

monds Metal-Cutting Band Saws can do a score of os, and do them all at top speed and accuracy . . . t-off work, contour cutting, and cutting of irregular apes like jigs, dies, fixtures, as well as heavy straight oduction cuts . . . and many other similar jobs.

And Simonds Metal Bands earn top profits on these jobs because they're made to *stay* on the job many hours longer . . . running smoothly, easily, cleanly. Simonds special steel, perfect tooth-milling and even tooth-set . . . those are the Simonds *extras* that *pay you extra* on every Simonds Metal Band you buy. Order from your distributor today.

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SAW AND STEEL CO.
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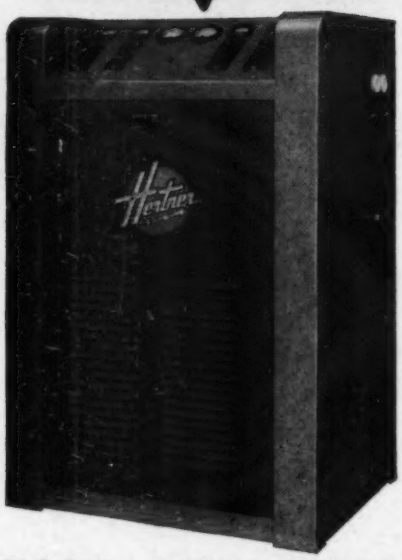
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS — Special Electric Furnace Steels
SIMONDS — Grinding Wheels and Grains
SIMONDS — Simonds Products for Canada

NCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First ., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. i St., Montreal 30, Que.

Get the benefits of
MOTOR-GENERATOR
BATTERY-CHARGING
for your
MOTORIZED LIFT-TRUCKS

HERTNER
TYPE "H"
MULTIPLE BATTERY
CHARGER



FULLY AUTOMATIC!

The Hertner Type "H" Motor-Generator Charger charges two or more batteries by completely automatic controls without removing the batteries from trucks.

Fully Charge Lead-Acid Batteries in 8 Hours—
Nickel-Alkaline Batteries in 7 Hours

Two and four circuit Type "H" chargers are self-contained units with motor-generator sets mounted inside control cabinet. Individual ammeters record charging rate of individual circuits.

Desk top height of instrument panel makes readings of charging rates available at a glance. Screened covers at sides and back provide air circulation for cool operation. Each charger is provided with charging cable—nothing else to buy, since unit is *complete.*

Mail coupon for Bulletin 102 which gives full details of Hertner Type "H" Multiple circuit chargers.

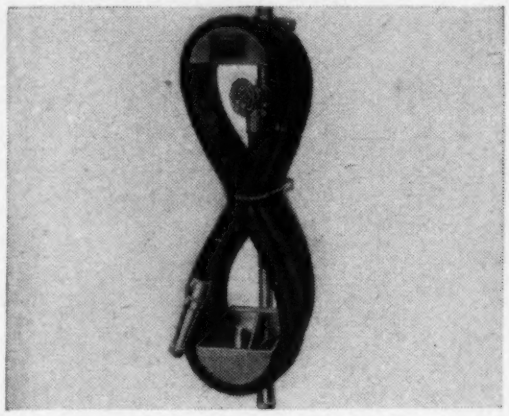
The HERTNER Electric Co.
A General Precision Equipment Corporation Subsidiary
Motors • Motor-Generators • Generator Sets
Cleveland 11, Ohio
Representatives in principal cities

THE HERTNER ELECTRIC COMPANY
12750 Elmwood Ave., Cleveland 11, O.
Send copy of Bulletin 102 to:
Name_____
Address_____
City_____ State_____

oiling. Outside diameter of the motor is 3¼ inches. Mounted on a pedestal, the motor is supplied with 3-step pulley, foot rheostat, and reversing switch. L & R Manufacturing Co., 577 Elm St., Arlington, N. J.

FIRE EXTINGUISHING UNIT

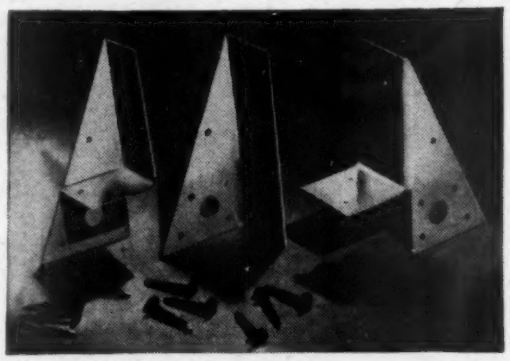
Unlimited supply of extinguishing agent is provided as water fog with Figure 1030 fire equipment, which connects directly to a water line. Swing joint



mounting permits the fixture to turn in alignment with direction of the hose pull. A 50-ft. length of ¾-in. high-pressure hose is racked in figure 8 position for quick removal. The nozzle supplies finely atomized water with medium pressures, and produces a curtain of protecting fog in front of the operator, shielding him from the intense heat of the blaze. Bowser, Inc., Ft. Wayne, Ind.

FRAMING ANCHOR

Timber connector, known as Trip-L-Grip framing anchor, is designed to increase rigidity around window and door openings, and to add strength in floor and wall framing. Made of 18-gage zinc



coated corrosion-resistant sheet steel, the anchors are joined to the wood with full bodied nails, which are said to develop maximum shear without splitting the lumber. Bridging is eliminated in attaching joists on trusses, and notching is unnecessary. If connections are at angles, flanges can be bent accordingly. Timber Engineering Co., 1319 18th St., N.W., Washington 6, D.C.

HAND TRUCKS

Built from high-carbon steel tubing, hand truck weighing 40 pounds is designed for maximum strength and minimum weight. Has no bolts, rivets, or sharp splinters, thereby giving a smooth top and bed. Handles allow a natural

Simplex
UTIL-A-TOOL

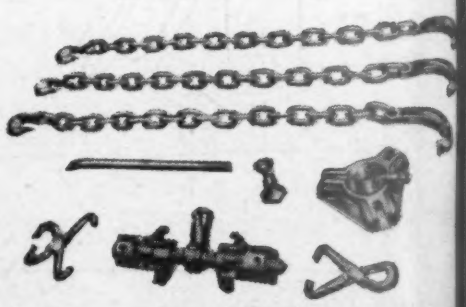
CUTS COSTS
—on Pulling, Pushing, Spreading, Bending, Clamping, Holding and Lifting Jobs

• There's hardly a spot in any bu plant or in the field where you won find many uses for a "Util-A-Tool" Set—on production installation, mai tenance and repair operations.

Here are a few of the many jobs Simplex "Util-A-Tool" handles wit cost-cutting speed and efficiency (1) Clamping and holding parts fo welding or assembly, (2) Pullin pinions, bushings, wheels, and gear (3) Lifting or lowering heavy ma chinery for installation, leveling o maintenance, (4) Serving as a hand beam clamp for chain hoists with th use of sky hooks.

Time and labor savings on a singl job often save more than the full co of a "Util-A-Tool" Set. Now available for immediate delivery throug distributors everywhere. Write fo Bulletin P & P-46.

"THE TOOL OF A THOUSAND USES"



TEMPLETON, KENLY & CO.
1018 South Central Ave., Chicago 44, Ill.

Conveniently-packaged, space-saving V★S Drives are available from 1 to 200 hp.

PRODUCTION COSTS DOWN with RELIANCE V★S DRIVE

The *All-electric, Adjustable-speed Drive operating from A-c. Circuits,* V★S provides quick, smooth starts and stops —an infinite range of truly stepless speed changes—continuous maintenance of proper tension. Control can be automatic or manual . . . right at the machine or from nearby or remote stations. If you have not yet discovered the variable-voltage way to increased production and lower costs, write today for Bulletin 311—or call your nearest Reliance representative.

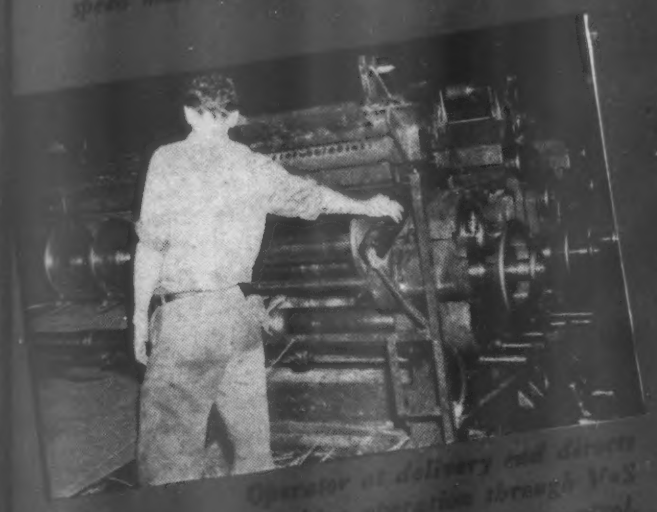
RELIANCE ELECTRIC & ENGINEERING CO.

1070 Ivanhoe Road • Cleveland 10, Ohio

Appleton, Wis. • Birmingham • Boston • Buffalo • Chicago
Cincinnati • Denver • Detroit • Gary • Grand Rapids
Greenville, S. C. • Houston • Kansas City • Knoxville
Los Angeles • Milwaukee • Minneapolis • New Orleans
New York • Philadelphia • Pittsburgh • Portland, Ore.
Roanoke, Va. • Rockford • St. Louis • San Francisco
Seattle • Syracuse • Tampa • Tulsa • Washington, D. C.
Sao Paulo, Brazil

Feeding corrugated board into printer-slotter equipped with V★S Drive. Adjustable-speed motor is built into machine at right.

RELIANCE V★S DRIVE

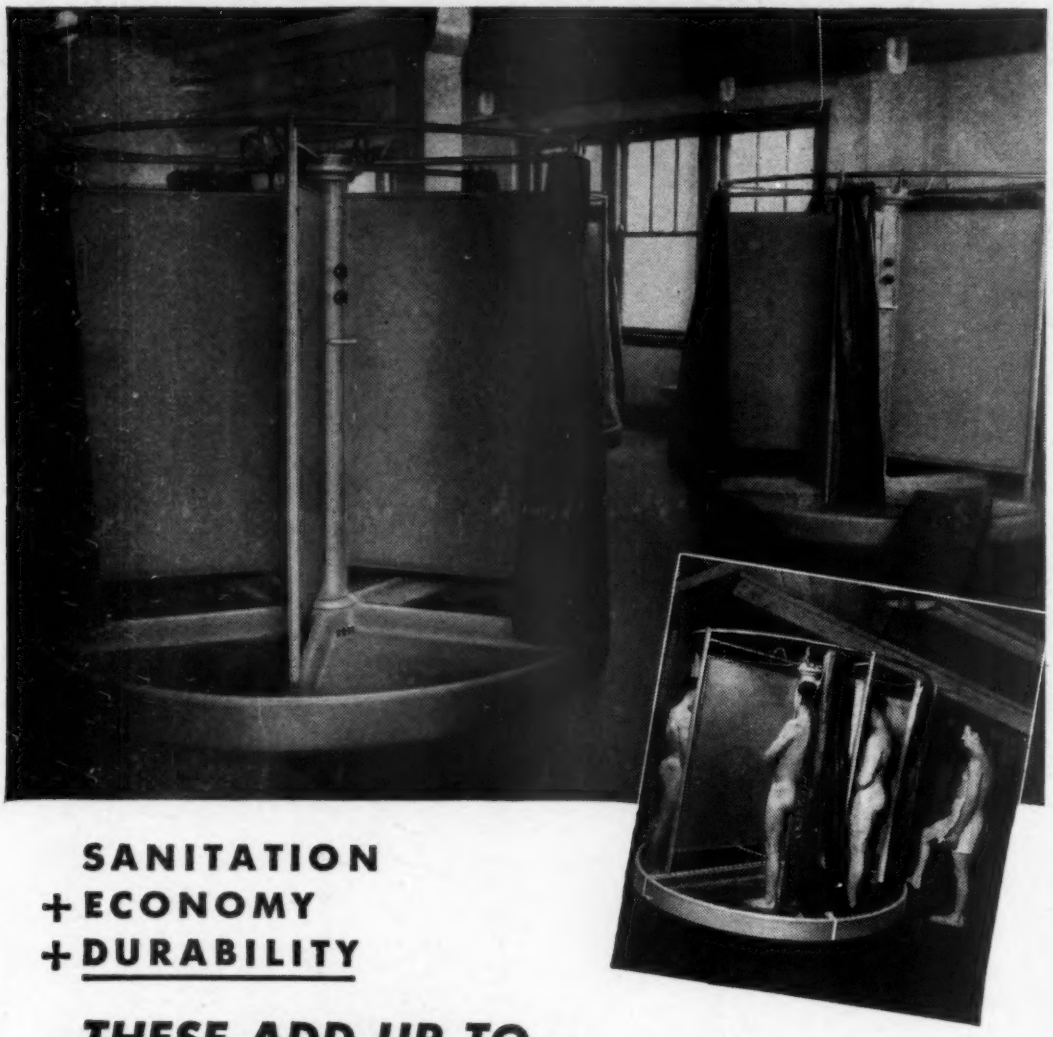


Operator at delivery end directs machine operation through V★S All-electric push-button control.

Stacks of slotted and printed board accumulate fast with V★S Drive on the job.

RELIANCE A-C D-C MOTORS

"Motor-Drive is More Than Power"



SANITATION
+ECONOMY
+DURABILITY

THESE ADD UP TO—

BRADLEY MULTI-STALL SHOWERS

Employee wash facilities, to be complete, require some form of shower convenience, for workers like to leave the dirt and grime of their jobs behind them when the day's work is over. Modern progressive industries, recognizing this need, have selected Bradley Multi-Stall Showers for maximum sanitation, economy of operation and long-life durability. Employers also report that such installations keep necessary wash-up *time* to a minimum.

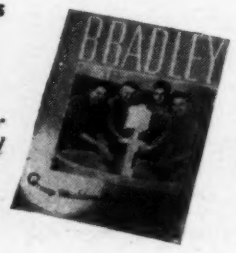
One Bradley 5-Stall Shower unit requires only 3 plumbing connections in comparison to 15 needed for 5 "single-stall" units. This simplified installation plus complete absence of corners and dirt-collecting pockets cuts cost of upkeep and janitor detail. Savings are also realized through lower hot water costs made possible by reduced water consumption.

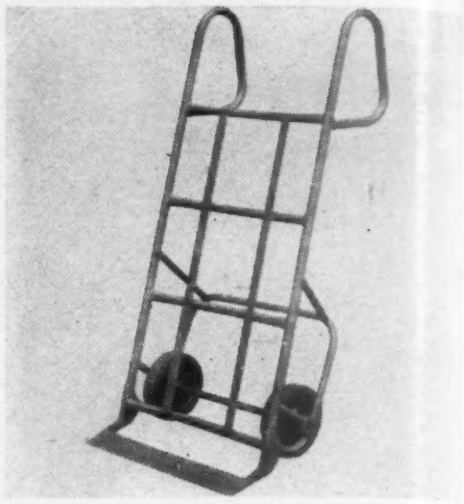
Whether you are building a new plant, modernizing an existing structure or expanding present facilities, Bradley 5- or 3-Stall Shower units can be installed quickly and easily on any kind of floor including wood. BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan Street, Milwaukee 1, Wisconsin.

Distributed Through Plumbing Wholesalers

BRADLEY multi-stall showers

Send today for new illustrated Catalog 4701.

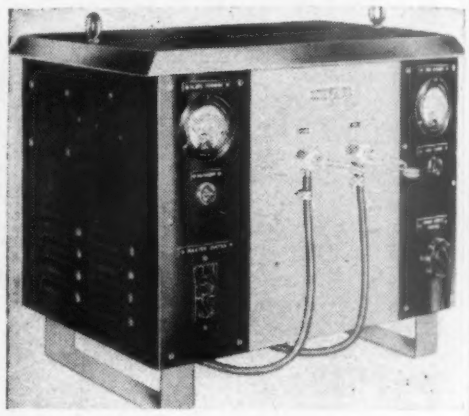




hand grip in all positions of truck, and a bar above the wheels provides for foot power "breaking" of the load. Weight of the load is forward on the axle, and not carried by operator. Any standard size and type of wheel can be furnished. Tubar Bending & Mfg. Co., 3901 Lakeside Ave., Cleveland 14.

INDUCTION HEATER

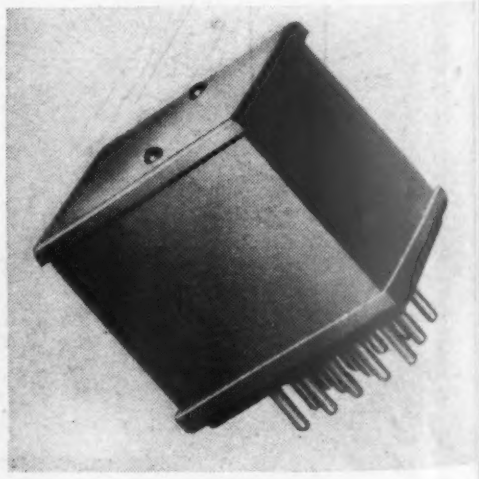
Measuring 22x20x16 inches, 2-kw. induction heating unit can be used on a shop bench. It operates from a 110-volt line, and is supplied with foot switch



and one work coil. The coil can be made from ½ to 2½ inches in diameter, and the unit will operate with a coil of 1 to 20 turns. Scientific Electric Div., S. Corrugated Quenched Gap Co., Garfield, N. J.

AUTOMATIC RHEOSTAT

Basically a direct-acting rheostat type of regulator, the Regohm is adaptable to applications such as generator regulators, line regulators, close differential relay pilots, and sensitive elements for



The Man who Smiled for 47 Years and 27 minutes!

by Mr. Friendly

Mr. Glib, of the Glib Company, was a great believer in smiles... he told his employees to smile, smile, smile... and they did.

And then one day...

The production manager came into Glib's office. "Production is off 50%!" he smiled...

"Accidents are up 60%!" he grinned...

"And worker morale"...he laughed merrily, "Is absolutely frightful!"

Then it happened! For the first time in 47 years and 27 minutes, Mr. Glib frowned...

He tried to smile the old Glib smile...He put on his patented smile restorer...but it was no use... inside, he was weeping...

At that fateful moment, who should walk in, but Mr. Friendly, the American Mutual Man.

"I've got a real smile restorer," he said, "It's called I.E. Loss Control*...a special service that cuts accidents, booms production and zooms worker morale"...

"Best of all" he continued, "You get I.E. at no extra cost!"

Well, Glib signed up with American Mutual quick as a wink, and that was the answer to the smile shortage in the Glib plant.

Today they're smiling 8 hours a day...with a smile and a half for overtime!

You can put smiles in your plant, too ... And at no extra cost!

Write today for full details on American Mutual's I.E. Loss Control, the service that goes with every industrial policy. Don't delay...Here's the address: American Mutual Liability Insurance Company, Dept. F-8, 142 Berkeley Street, Boston 16, Mass.

****Accident prevention based on principles of industrial engineering.***

A M

Your helping hand when trouble comes!

American Mutual...

the first American liability insurance company

● 1947, AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

Let CHAMPION *Experts* INVESTIGATE!

Champion's lighting engineers are interested only in helping you to get better lighting and thereby increase your production efficiency, safety, working morale and lighting economy. Their unbiased recommendations are freely available to every user of Champion **Fluorescent** and *Incandescent* Lamps.

Whatever your lighting problem, large or small, you will find it profitable to take advantage of the Champion combination of lamps of fine quality and lasting dependability, supplied by a competent local distributor who knows industrial service needs and backed by competent lighting engineering counsel.

CHAMPION LAMP WORKS

Lynn, Massachusetts

A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO.

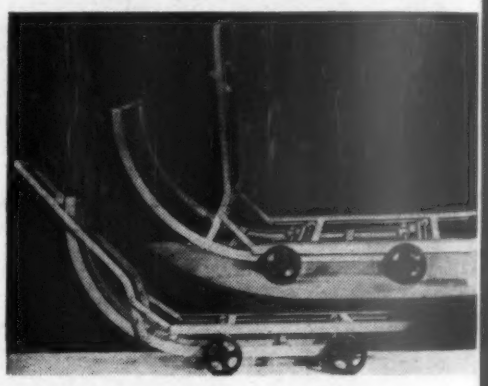
controlling saturable reactors or electronic tubes. Coil power consumption is 1 watt; with voltage dropping resistor (furnished optionally) about 5 watts. Coil is supplied for d.c. operation only. A small dry disk rectifier is required for a.c. use. Provides ten steps of control resistance at up to 8 watts per step with 80 watts maximum total. Operates in any position and weighs 7 ounces. Electric Regulator Corp., 1915 Park Ave., New York 35.

REFRACTORY CEMENT

Air-setting refractory cement, called Air-Set, for use as a bonding mortar with firebrick and insulating firebrick, is suitable also as a protective facing for firebrick or insulating firebrick furnace linings. It has high plasticity, and can be troweled directly from the drum after months of storage, and can be thinned with water to dip joint or facing consistency. Maker says the cement will not soften or run out of the joints, but remains in place to form a tight, dense joint capable of withstanding abrasion, slagging, and spalling. Obtainable in 16-, 50-, 95-, and 185-lb. steel drums. Armstrong Cork Co., Lancaster, Pa.

HAND LIFT TRUCK

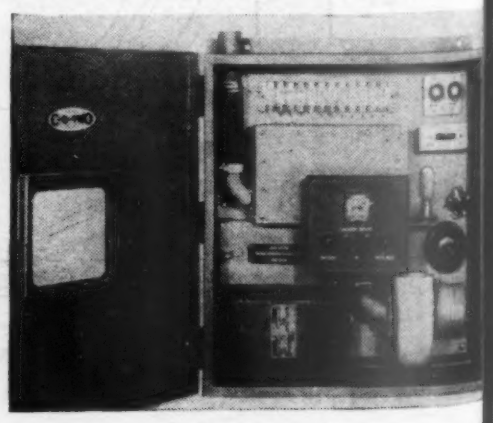
Short move jobs involving loads up to a ton can be handled by light hand truck 70 inches long, with platform area of 11¾x43 inches. The truck is suitable for



moving skidloads, boxes, and trays of material, and similar items. With platform lowered, it has ample clearance under a skid box. An easy pull lifts the load above the wheels, and locks it securely. Arcade Mfg. Div., Rockwell Mfg. Co., Freeport, Ill.

SMOKE DETECTOR

Fire can be detected in storage or record vaults and other spaces in the plant by means of smoke detector with an



A new era in lubrication...

T5X

THE SENSATIONAL PURPLE OIL!

For the first time since its wartime development, T5X—the sensational new purple oil for gasoline, Diesel, natural gas, and butane-powered engines—is available in quantity. T5X is a fully compounded, detergent-type oil. Its distinctive color comes from an exclusive ingredient which helps give the oil its remarkable stability.

Just how good is T5X?
Take a look at these test results!

DIESEL TESTS—T5X easily passed the grueling 500-hour continuous-run test in a high-speed automotive-type Diesel engine operating at 2000 r.p.m. and maximum load . . . considered the most exacting test of all for Diesel lubricants!

GASOLINE ENGINE TESTS—In the "L-4" Coordinating Research Council designation tests for gasoline engine lubricants, T5X lasted *double* the length of time required for top lubricating performance!

Recommended uses

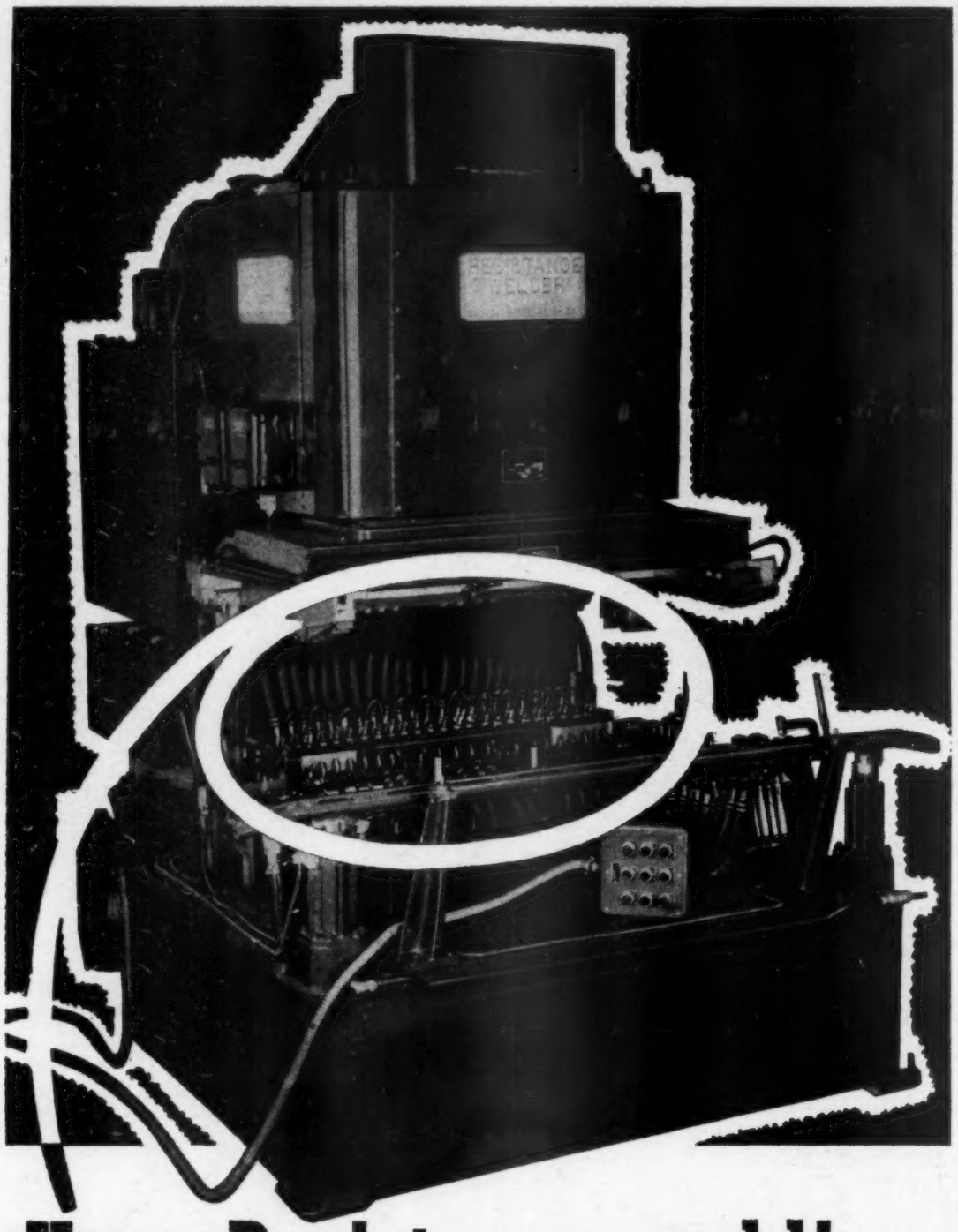
T5X is so high in quality, so versatile in its uses, that it will give outstanding protection and performance in any kind of gasoline, Diesel, natural gas or butane-powered engine in *any* industrial operation. T5X performance has been praised by literally thousands of engineers, farmers, shop foremen, maintenance men, etc.

Phone your local Union Oil Representative or wire Sales Dept., Union Oil Company, Los Angeles 14, California, for full information on T5X—the sensational *purple* oil.

T5X—"as distinctive in quality as it is in color"

UNION OIL COMPANY

OF CALIFORNIA



Here, Resistance-welding Costs "Get the Business"

The toughness of Ampco-weld resistance-welding electrodes reduces down-time, increases production, saves money . . .

The machine shown above—and 5 more just like it — must produce 1404 spot welds per minute. They are used by a leading automobile manufacturer to turn out 18 complete underpan assemblies per minute—each pan requiring 78 spotwelds.

Rigorous production schedules such as this, call for trouble-free operation. Ampco-weld resistance welding electrodes are ideal for this kind of service. They combine the hardness and toughness necessary to resist mushrooming and wear, with a high electrical conductivity that resists sticking to the work. Because of these features, Ampcoloy electrodes require less dressing — down-time is greatly reduced; production is increased.

The Ampco line of resistance welding electrodes and alloys is complete. It includes standard and special holders; all products meet R.W. M. A. specifications. Furthermore, Ampco is glad to furnish engineering service for specialized applications. Consult your nearest Ampco field engineer and write for latest bulletins.

Ampco Metal, Inc.

Department FM-5 • Milwaukee 4, Wis.

RESISTANCE WELDER MANUFACTURERS ASSOCIATION • RWMA

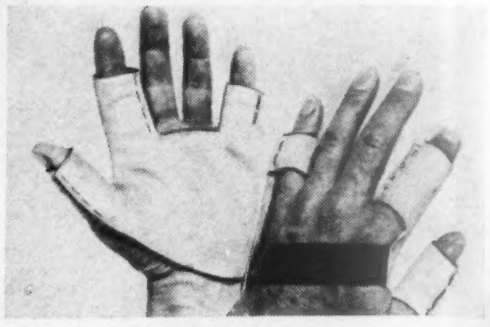
AMPCO

RW-8

enclosed light beam. Air samples are continuously drawn into a detecting chamber where, at the first sign of smoke, a red indicating lamp is lighted and an alarm sounds. A supervisory lamp and audible alarm provide continuous supervision of the detector. C-O-Two Fire Equipment Co., P.O. Box 390, Newark 1.

HAND GUARD

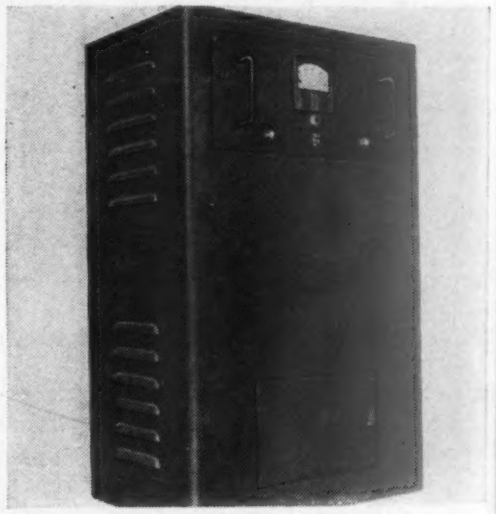
Freeing thumb and fingertips for picking up materials, Steel-Grip Handguard No. 15407 protects the palm, first finger, and palm side of the little finger. Flex-



ibility is provided by open-back construction. Made of split cowhide, steel stitched throughout, the guard has elastic web band on the back. Sizes for men and women may be supplied in pairs or for right or left hand only, as required. Industrial Gloves Co., Danville, Ill.

VOLTAGE REGULATORS

Line of Stabiline (type EM—electromechanical) voltage regulators features control circuit which dictates the operation of the power elements to provide a constant voltage from fluctuating a.c.

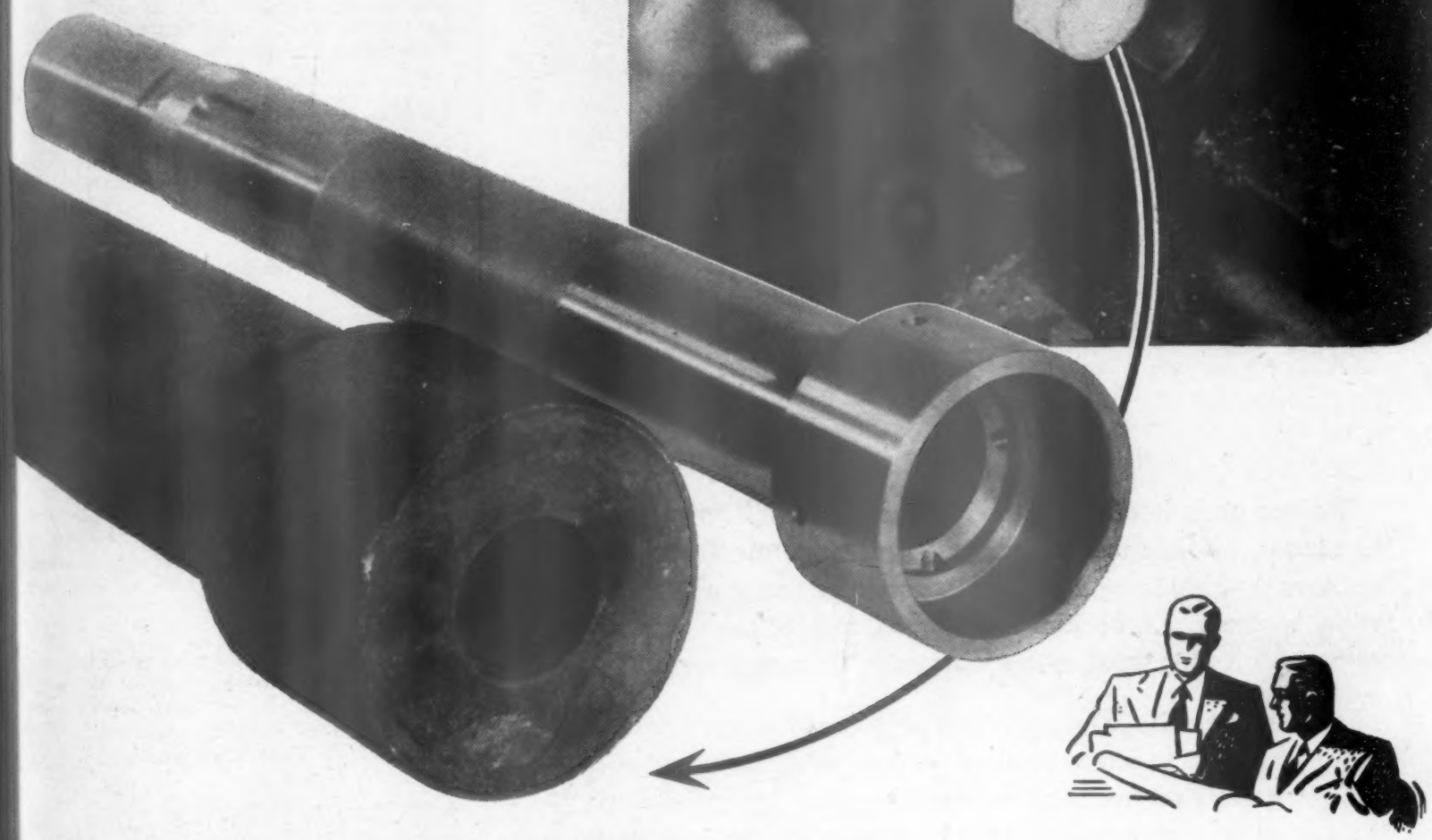


power lines. All removable components, such as the voltage sensitive element and the unbreakable relays, are plug-in type. Exchange arrangement permits the complete assembly to be un-plugged from the power elements and replaced by another unit, if necessary. All wiring is concealed. The power elements are compact, and are fitted to small cabinets. The Superior Electric Co., 1043 Church St., Bristol, Conn.

TRACTORS

Replacing previous models, Type D6 tractor develops 65 drawbar horsepower and 75 belt horsepower, an increase of 10 horsepower over its predecessor, while the D4 tractor, with 43 drawbar horsepower and 48 belt horsepower, offers a 20 per cent increase in work power. A

Here's where you can cut production costs!



The external upset operation being completed on this section of OSTUCO Seamless Steel Tubing will cut production time and costs in the final machining process in the customer's plant. This is just one of the many forming operations performed by The Ohio Seamless Tube Company—operations that conform exactly to the customer's blueprints and specifications.

Our sales engineers will gladly show you how the uniform quality and machinability of OSTUCO Seamless Steel Tubing, formed to your exact requirements, will simplify the manufacture of your product. Our skilled craftsmen, world-famous for their deftness in forming seamless steel tubing, will help make yours a better product.

Complete information is available, without obligation, at the nearest sales office.

THE OHIO SEAMLESS TUBE COMPANY

Plant and General Offices: **SHELBY, OHIO**

SALES OFFICES: CHICAGO, Civic Opera Bldg., 20 North Wacker Dr. CLEVELAND, 1328 Citizens' Bldg. • DETROIT, 2857 E. Grand Blvd. HOUSTON, 927 A M & M Bldg. • LOS ANGELES, Suite 200-170 So. Beverly Drive, Beverly Hills • MOLINE, 309½—16th St. • NEW YORK, 70 East 45th St. • PHILADELPHIA, 123 S. Broad St. • ST. LOUIS, 1230 North Main St. • SEATTLE, 3205 Smith Tower • SYRACUSE, 501 Roberts Ave. • TULSA, Refinery Engr. & Equip. Co., 604 Ten E. 4th St. Bldg. • CANADIAN REPRESENTATIVE: Railway & Power Corp., Ltd., HAMILTON, MONTREAL, NORANDA, NORTH BAY, TORONTO, VANCOUVER and WINNIPEG.

CROTTY-OPERATED RESTAURANT AT THE ALLENTOWN, PA., MACK TRUCK PLANT OF INTERNATIONAL MOTOR TRUCK CO.

"The Mack truck restaurant makes the job easier"

"Having good hot food at the Mack restaurant," says Harry Renninger, "makes the job easier." And since Mr. Renninger has been a valued employee for 18 years, he can speak for his fellow workers . . . who like the convenience of the company restaurant; find it "makes the job easier" in many ways.

As a feature of its labor relations program, Mack Truck uses Crotty Brothers' in-plant feeding service to make appetizing and nutritious food available to Renninger and his co-workers. Through a central cafeteria and food wagons that circulate throughout the big Allentown plant every morning and afternoon, 4,000 employees are served.*

Mack Truck officials feel the advantages of having a company restaurant are helping their efforts to accelerate much-needed production. And their satisfaction with Crotty Brothers' operation is evident in their extension of Crotty service to their Plainfield, N. J., plant.

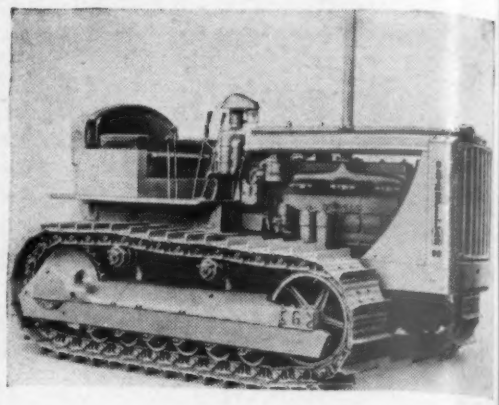
★ *From a series of case studies of in-plant feeding made by Richardson Wood, Industrial Analyst. A copy of his report on management's postwar opinions about employee feeding will be gladly sent free on request.*

CROTTY BROTHERS INC.

OPERATING IN 15 STATES AND 37 CITIES

137 NEWBURY STREET · BOSTON 16 · MASS.

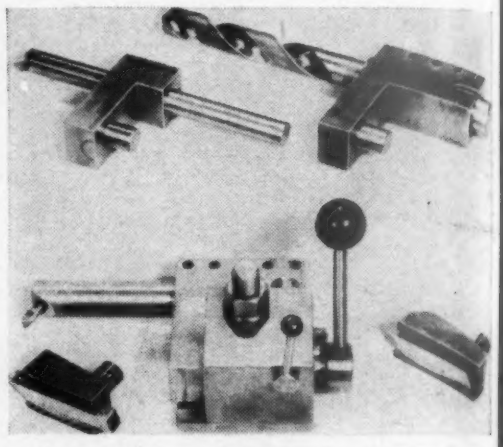
INDUSTRIAL RESTAURANT OPERATORS *EXCLUSIVELY* SINCE 1930



spring-compensated steering clutch release mechanism facilitates steering in the D4 tractor. Both models have transmissions, final drives, and clutches improved by harder metals and better heat-treatment, manufacturer says. Caterpillar Tractor Co., Peoria 8, Ill.

TOOL HOLDER

Multi-duty tool holder facilitates drilling, reaming, tapping, boring, and similar operations. Has large solid steel base



and hardened and ground working and locating parts. Can be fitted to the compound of most bench and heavy-duty engine lathes. Airo Products Co., 2709 West 54th St., Los Angeles 43.

AIR CONDITIONERS

Made in 2-, 3-, and 5-hp. sizes, cabinet-enclosed air conditioning units, called Unitaire, include compressor, condenser and evaporator, glass wool filters, and a fan. A heating coil and humidifiers may be obtained for year-round air conditioning. The 2-hp. model conditions up to 800 cubic feet of air every minute, the 3-hp. up to 1200 cubic feet, and the 5-hp. unit 2000 cubic feet. Panels are remov-

able to facilitate inspection and servicing. The hermetically sealed compressor and fan assembly are mounted on rubber. Sturtevant Div., Westinghouse Electric Corp., Hyde Park, Mass.

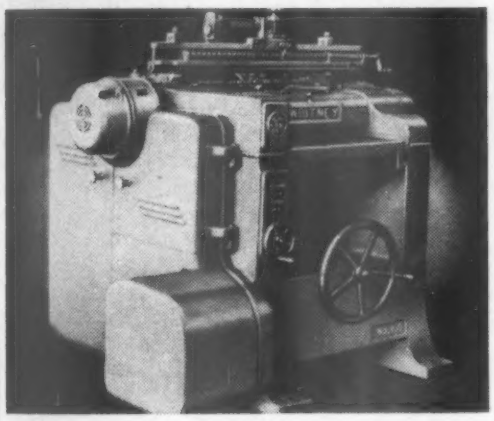
HAND-GUIDED TRACTOR

Intraplant towing unit is powered by electric storage battery, and guided by operator, who maneuvers and walks the

load. Called the Worksaver tractor, because its power plant, control, and handling are of the same type as in the Worksaver lift trucks, the unit is built for hauling heavy trailer loads, such as bar stock. The three wheels are 10 inches in diameter, with 5-in. rubber tires. The Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24.

PLANER

Single surface cabinet planer, No. 105, built 24 inches wide, is of medium capacity. Has one-piece base, integrally cast upper and lower wedge assemblies, 4-knife round cutterhead, four gear-



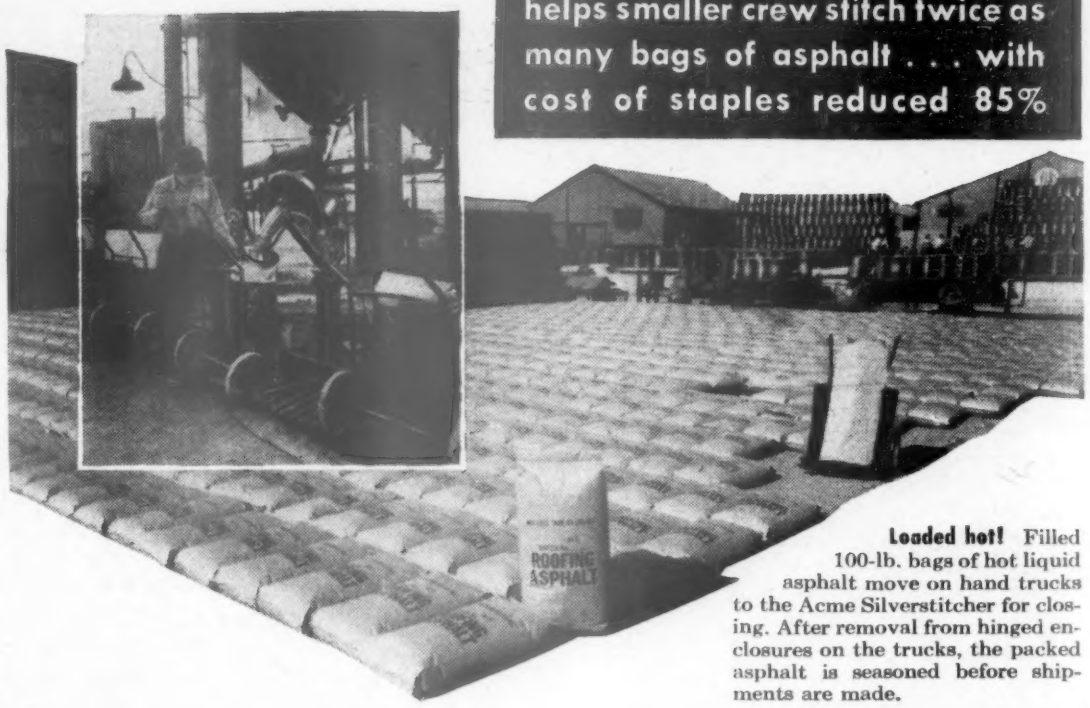
driven feed rolls, sectional infeed roll and chipbreaker, micro-feed selector giving between 20 and 60 f.p.m. range, and dial feed indicator. Also includes convenient fingertip controls, built-in cutterhead and feed motors, and electric knife grinder. Furnished ready to wire and start running. Baxter D. Whitney & Son, Inc., Winchendon, Mass.

GOGGLES AND LENSES

Protecting wearer against dusts, goggle is designed for wide-angle vision, comfort, and safety. Wire screen ventilators around eyecups help keep lenses from fogging. Sparks and flying objects cannot reach eyes. Flexible leather mask is bound at the edges with soft corduroy, and the eyecups are set deep to prevent obstruction with side vision. Goggle is available with Super Armorplate or 6 Curve Super Armorplate clear or Calobar lenses. Also announced are 6 Curve Super Armorplate Didymium lenses which permit glass workers to look through opaque yellow light emitted by

Doubles Output with Fewer Men

Read how Acme Silverstitcher helps smaller crew stitch twice as many bags of asphalt . . . with cost of staples reduced 85%



Loaded hot! Filled 100-lb. bags of hot liquid asphalt move on hand trucks to the Acme Silverstitcher for closing. After removal from hinged enclosures on the trucks, the packed asphalt is seasoned before shipments are made.

What would you do if this were your problem?

A large producer of roofing asphalt bags his product at a temperature of 300° F. While still hot, the bags must be sealed. An eight-man bag-loading crew could staple 500 bags in eight hours . . . a slow, tedious, expensive operation.

So he came to Acme Steel.

Speeds Output...Cuts Costs

Acme built a Silverstitcher to accommodate these bags. Now they move on a "production line" basis. As the bags pass the Silverstitcher, the stitching mechanism is tripped, and Acme Silverstitch wire closes the tops of the filled packages.

The crew has been reduced to seven men. The output is exactly double. Wire staple costs are 85% less!

This true case history is not unusual. Acme Steel specializes in cutting costs, speeding production in the container closure field. For more information, clip the coupon —or write direct for help on your specific problem.

ACME STEEL COMPANY

NEW YORK 7 CHICAGO 8

ATLANTA LOS ANGELES 11

Acme Steel Company, Dept. FM-57
2838 Archer Avenue
Chicago 8, Illinois

Gentlemen:

Send me your free booklet describing Acme Silverstitchers and their applications.

Name .....

Company .....

Address .....

City..... State.....

ACME & MORRISON Silverstitchers
REG. U. S. PAT. OFF.

AND SILVERSTITCH BOX-STITCHING WIRE

Small Business NEEDS

CLARK'S cost-cutting benefits

TRUCK LOADING
1,000 lb. Gas "Trucloader"

•Small Business...
SHRINKS HANDLING COST

A St. Cloud, Minnesota contractor cuts handling costs to a minimum with CLARK "Trucloader".

WAREHOUSING
1,000 lb. Gas "Trucloader"

•Small Business...
DOUBLES STORAGE SPACE

The nation's many franchise bottling plants save space, time and money by handling unit loads with CLARK fork trucks.

RECEIVING
1,000 lb. Electric "Trucloader"

•Small Business...
CUTS ACCIDENTS, DEMURRAGE

CLARK fork trucks speed the loading and unloading of box cars and trucks, and reduce accidents, damage and demurrage.

TRANSPORTATION
A new series of Towing Tractors

•Small Business...
SPEEDS MATERIAL FLOW

The new "CLARKAT" towing tractor is an ideal medium for savings on long hauls between sidings, docks and warehouses.

ATTACHMENTS
Scoops Cranes Rams Clamps etc.

•Small Business...
MEETS VARIED NEEDS

The many attachments and devices for CLARK fork trucks enable a single machine to perform a number of different jobs.

CUT COST FACTORS
WITH CLARK
TRUCTRACTORS

and Small Business needs ***MATERIAL HANDLING NEWS*** *. . . shows new machines, new devices, new methods that cut production cost.*

CLARK TRUCTRACTOR
Division of CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN

OTHER PLANTS – BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

Other CLARK Products

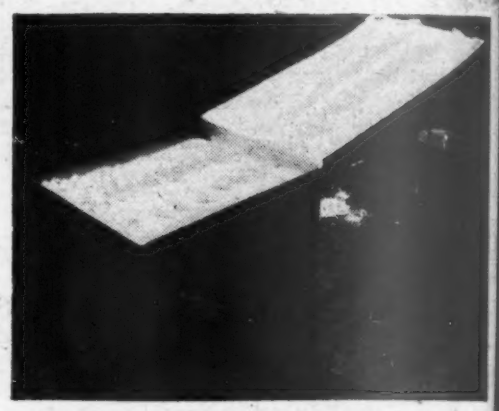
FORK LIFT TRUCKS		ELECTRIC STEEL CASTINGS
TOWING, DUMP AND	DRILLS	METAL SPOKE WHEELS
SHOVEL TRACTORS	& GEARS	AXLES & HOUSINGS
RAILWAY TRUCKS		TRANSMISSIONS

Prices on CLARK products will not be advanced in excess of increased costs.

burning sodium and see hidden work areas in glass blowing, fusing, and cutting operations. Supplied in orbit shape or 50-mm. round for spectacle or cup type goggles. American Optical Co., Southbridge, Mass.

TANK FIRE EXTINGUISHERS

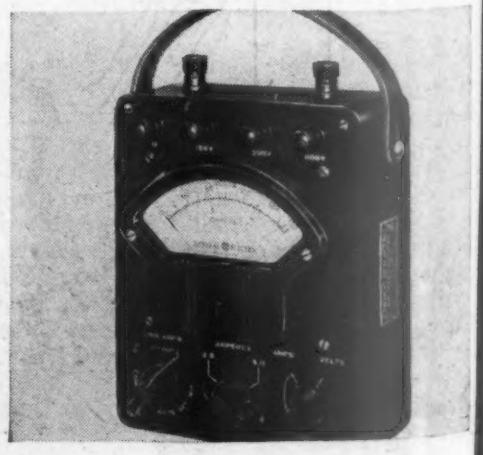
Foam firefighting equipment, for dip and quenching tanks and drainboards, is claimed to control gasoline and other fires in 25 seconds, with complete extinguishment in one minute. The units



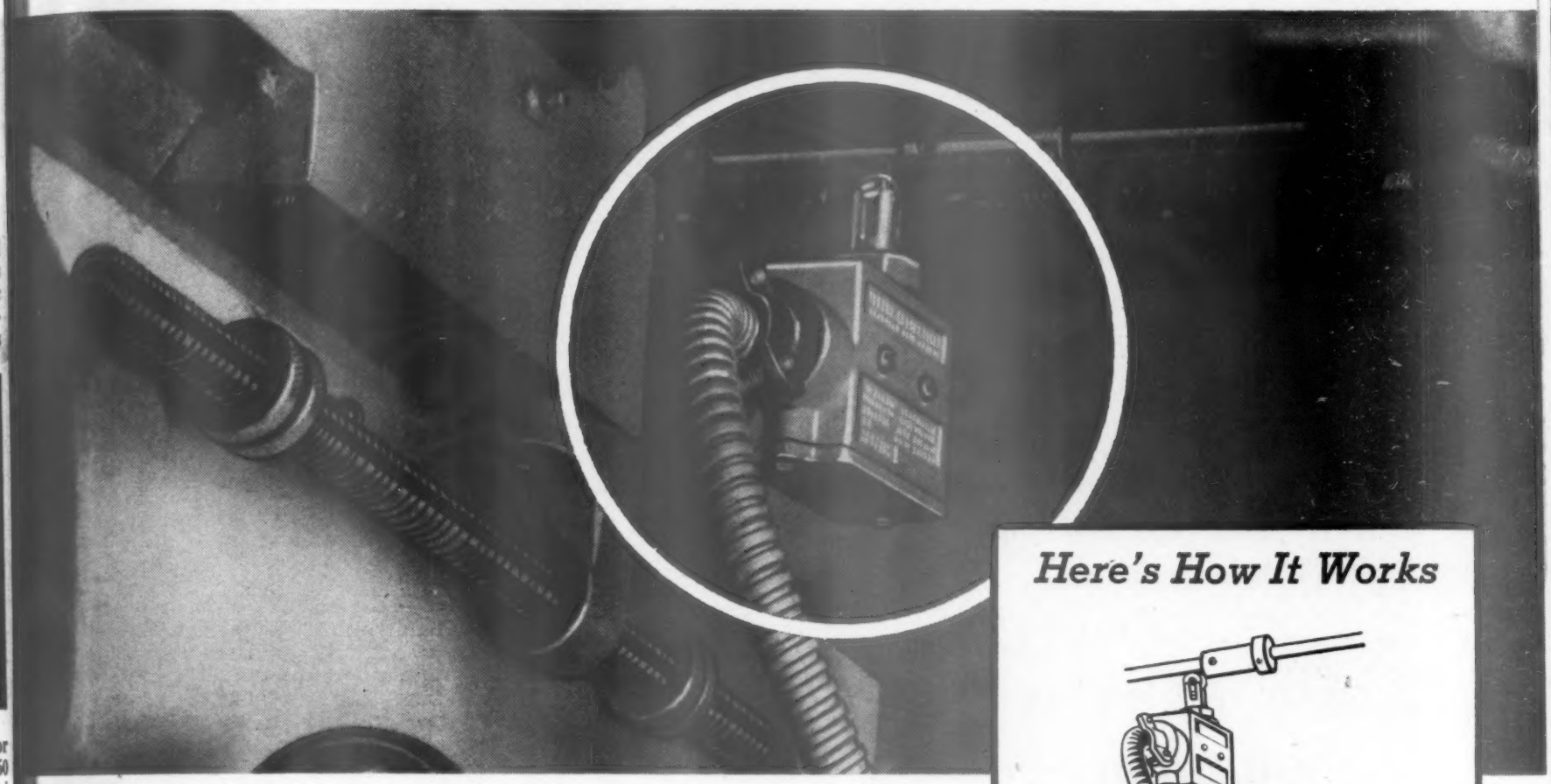
are made in three standard sizes, for operating pressures between 20 and 50 p.s.i., and up to 100 p.s.i. may be used in dip tank firefighting equipment. The apparatus consists of a brass foam-maker body, a steel discharge tube, and steel deflector box, which is assembled onto the side of any standard tank. The fire-extinguishing foam, called Aer-o-foam, forms a gas-tight blanket over the fire, and remains after the tank cools to normal temperature. After the fire, the non-corrosive foam can be removed without contaminating the oil it protects. National Foam System, Inc., 1400 Packard Bldg., Philadelphia 2.

A.C. LOAD VISUALIZER

Type AF-1 a.c. load visualizer is a lightweight analyzer for use on single-phase and balanced polyphase systems. Serving as a standard 0-2.5/5-amp. ammeter and a 0-150/300/600-volt voltmeter, the instrument also can be used with the calculator furnished to determine watts, vars, volt-amperes, and power factor for



The Attachment of One MICRO Precision Switch Automatically Stops Milling Machine When Work is Finished!



● Plant engineers, shop superintendents, and time-study men are finding MICRO Precision Switches just what they need to speed up work on all kinds of equipment by making machine operations automatic.

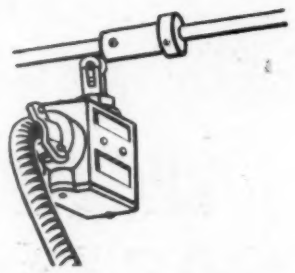
For example, this hand milling machine now stops automatically when the work is completed because a MICRO Precision Switch was installed under the table by a plant maintenance man.

A normally closed, die cast MICRO Precision Switch with roller actuator, stops the operation while the finished work is removed and new work placed in the chuck.

MICRO Precision Switches are available in a wide range of shapes, sizes and actuations and have hundreds of time saving plant uses. They are used as tension signals, cabinet door switches, thickness detectors, limit switches, level gauges, relay control, as safeties and for many other applications. The wide variety of actuators allows the switch to be actuated by cams, dogs, solenoids, relays, temperature fluctuations, liquids, etc. The wide variety of protective housings allows selection that will provide protection against dust and dirt, moisture, splash or explosion.

MICRO Precision Switches to meet your regular plant requirements are sold through selected wholesalers who are listed in the classified section of telephone directories in principal cities. For special advice call or write your nearest branch or sales representative as listed below.

Here's How It Works



As carriage of milling table moves to end of work, the dog on the rod below the table contacts the roller actuator of the normally closed MICRO Precision Switch.

The circuit is opened and the mill stops automatically until the switch is released.

Roller Plunger Switch Type "Q9"

The Type "Q9" Die Cast Enclosed Switch is fitted with a hardened roller which can be set longitudinally or crosswise.
The roller is ½" in diameter, with a 3/16" face and is fitted with an oil impregnated bearing. It can be operated by a cam with as much as 30° rise.

MICRO Precision Switches

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Just a few minutes a day . . .

AT *Daisy* MANUFACTURING COMPANY

ROSS LIFT TRUCK DOES DOUBLE DUTY

Here's a job that's typical of the many ways ROSS adaptability pays off for owners.

Daisy Mfg. Co., makers of the world's most famous air-rifle, use a standard ROSS Lift Truck equipped with 2 cu. yd. ROSS scoop to feed coal from stockpiles to boiler room bunkers. This machine enables one man to handle as much coal in a few minutes as two or more men and an ordinary truck formerly did in several hours. The lift truck carries approximately 3600 pounds of coal per trip — and makes a 200 yard round trip in five minutes or less.

And when this job is done, the operator makes a quick switch to standard forks. Then this same lift truck goes back to its regular work — handling the sheet steel, bar stock and other items that go into the manufacture of air rifles.

You too will find that ROSS Pneumatic Tired LIFT TRUCKS (sure-footed on rough ground, snow or mud) quickly pay for themselves on an endless variety of work. Get all the facts about these versatile machines — capacities, 6,000 to 18,000 pounds.

Rely On ROSS

THE ROSS CARRIER CO.

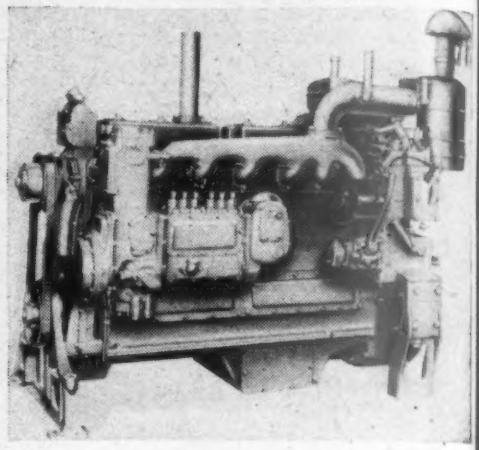
300 MILLER STREET, BENTON HARBOR, MICHIGAN, U.S.A.

Direct Factory Branches and Distributors Throughout the World

load surveys, induction motor tests, reactive-power studies, and power-factor checks on power and lighting circuits. Unit has an iron-vane moving element and insulated separate field winding for voltage and current. Operation is controlled by three selector knobs at end opposite connection terminals. Meter & Instrument Div., General Electric Co., Schenectady 5.

DIESEL ENGINES

Four-cylinder Type D315 diesel engine, replacing the D4400 model, and 6-cylinder D318, replacing the D4600 engine in manufacturer's line, are designed to pro-



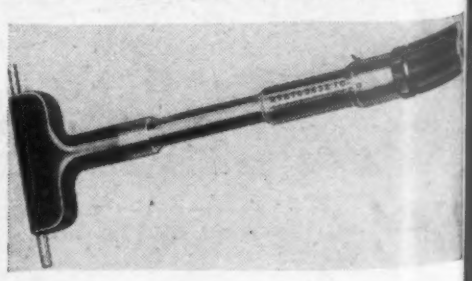
vide one-third greater power output than the previous models. With radiator fan and full equipment, the D315 has a maximum output of 70 horsepower, and the D318 is rated at 105 horsepower. Both engines are available as industrial units and electric sets. They feature a 4½-in. bore, a heavier, stronger crankshaft, larger valves and high valve lifts, and other improvements in design. Caterpillar Tractor Co., Peoria 8, Ill.

RUST REMOVER

Claims for liquid rust remover, named CorOdex, are that it is effective on any metal surface, will remove the thickest coat of rust, and that it penetrates to pin-point spots, cracks, or corners. Can be applied with paint brush or cotton swab, and requires no rubbing. It is also said to be non-explosive, non-flammable, and non-injurious to metal or user's hands. Small rust-coated objects may be treated by dipping in a glass or jar containing the liquid. Allied Products Co., Dept. R103, 1133 West Newport St., Chicago 13.

INSIDE MICROMETER

Called Rimat, micrometer is claimed to measure internal dimensions with accuracy and without time waste or possibility of error. When machining back of a flange, or boring recesses that have to be kept to close limits, the direct-reading tool is inserted, measurement taken, measuring pins are retracted, and tool is



How to choose and use specialty steels

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❶ Rex High Speed Tool Bits
Folder giving characteristics and applications of Crucible's Rex high speed tool bits.

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A folder on Crucible's Rexalloy tipped tools and tool bits for applications between high speed steels and tungsten carbides. Speeds and feeds on various materials; bit sizes; economies; increased efficiencies.

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HIGH SPEED · TOOL · STAINLESS · ALLOY · MACHINERY · SPECIAL PURPOSE STEELS

Chrysler Building, 405 Lexington Ave., New York 17, N.Y.

"FULL-RANGE" QUALITY STEELS for INDUSTRY

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Keep your floors
CLEAN, SMOOTH, SAFE
with the TENNANT System

You give morale its biggest boost right *here*—with floors kept smooth, clean, safe by the Tennant System. Dangerous oily grime, slippery grease, light-stealing dirt, jagged metal cuttings—you get rid of it all *in 1 fast operation!* Leaves your floors in perfect condition for fast traffic . . . and exactly right for your workers.

Fast, Efficient, Easy-to-Use

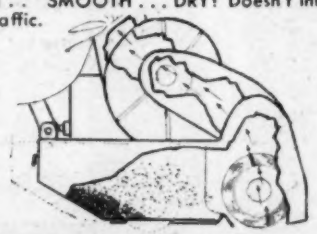
No matter how "impossible" your soilage problem, we believe Tennant has the answer: fast, mechanized *dry*-cleaning with a powerful, easy-to-use Tennant Floor Machine.

With drum-mounted accessories and materials, it eliminates messy water, chemicals and costly hand scraping . . . gives you clean, smooth floors in record time!

WRITE TODAY for bulletins, performance data and list of typical plants using the Tennant System. Prompt service.

REMOVES and PICKS UP GRIME IN 1 OPERATION

SELF-PROPELLED Tennant Industrial Floor Machine has high speed (1760 rpm) revolving drum for 12" or 16" accessories. Steel wire brush, Revo-tool, steel wool roll or fiber brush (depending on floor) cuts grime loose . . . hurls heavy dirt into hopper . . . sucks lighter soilage into bag. LEAVES FLOOR CLEAN . . SMOOTH . . . DRY! Doesn't interfere with traffic.



G. H. TENNANT CO.
2554 NORTH SECOND STREET
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YOUR FLOORS, LIKE ROADS, ARE SAFER WHEN DRY!

The way to finer floors
TENNANT
Floor Maintenance System

ASK a Tennant representative to inspect your floors

withdrawn. All wearing surfaces are hardened and ground, and can be adjusted if necessary. The micrometers have a range of 1 inch, and are available in sizes of 3 to 4 inches, with extra measuring rods up to 6 inches, and the 6-in. size with measuring rods up to 12 inches. Richards Machine Tool Co., 124 South Isabel St., Glendale 5, Calif.

FAN HEATER

Dual coil system in fan heater eliminates need for complex secondary piping, reducing stations, and accessories. Built for

high pressure systems, the fan heater is of standard design, employing centrifugal fans. Manufactured in size for large-scale installations. Niagara Blower Co., 405 Lexington Ave., New York 17.

MICROMETER

Structural weight is said to be cut up to 50 per cent in hollow, or tubular frame, micrometer. There is little or no drag, thereby facilitating repetitive measur-

ing. Spindle bushing assembly compensates for wear at the frame, and additional wear take-ups are provided at tip and on the thread. Threads are ground from solid, and the spindle and anvil are hardened to Rockwell 64-C to reduce wear. The spindle is lapped to a true fit with the barrel. Heavy-plated finish eliminates rust and tarnish, and resists corrosion from perspiration. Hollow frame structure and triple plating are designed to eliminate shock distortion if the micrometer is accidentally dropped. Tubular Micrometer Co., St. James, Minn.

OVERHEAD FOAM SPRAY

Spray deflector system for installation over hazards where any flammable liquids are stored dispenses Aer-o-foam to blanket and smother the fire. Spray nozzles may be placed over individual hazards, or spaced equidistant through-

OIL PURIFICATION

is a Dollars and Cents Profit to any company which is operating

- ☆ GAS, GASOLINE OR DIESEL ENGINES
- ☆ STEAM OR HYDRO-ELECTRIC TURBINES
- ☆ HYDRAULIC PRESSES OR MACHINES
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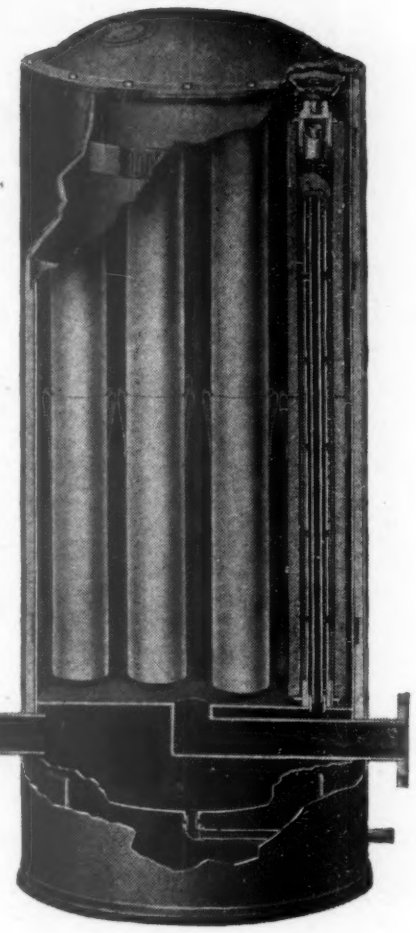
- ☆ CUTTING, HONING, BORING MACHINES, ETC.

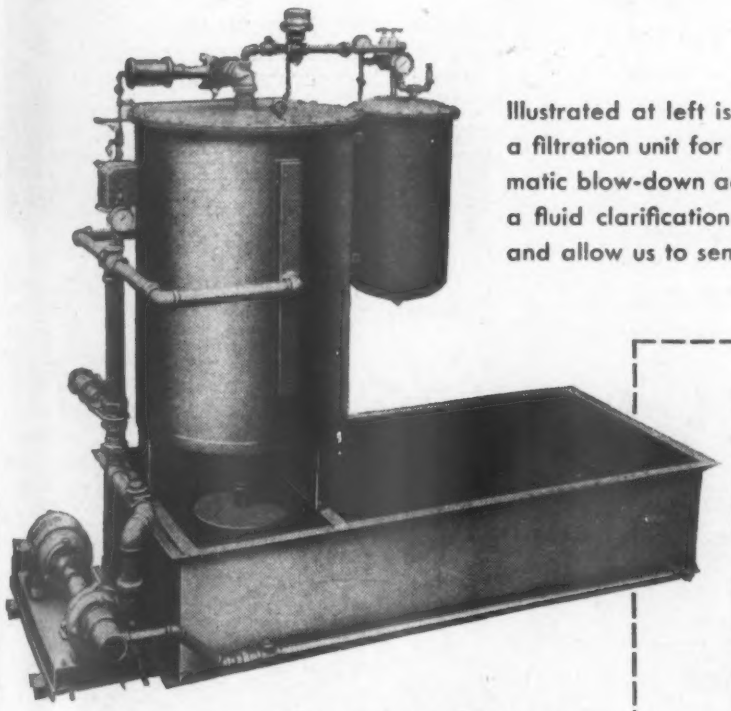


Any equipment will operate longer—at higher efficiency—with less maintenance cost—and less down-time—on CLEAN OIL.

Whether oil is used for lubrication, insulation or for transmission of mechanical force, there is a fully effective *Honan-Crane Oil Purifier* available to maintain that oil in its original *clean* condition—indefinitely in some instances.

Honan-Crane Oil Purifiers completely remove all solids (abrasives), tarry matter and acids (which produce gums, "varnishes" and sludges). By operating on clean oil *continuously,* you *eliminate excessive wear* on precision surfaces; *realize* the *maximum efficiency* at which your equipment is capable of operating—and you *greatly extend the safe-use-life of the oil you use.*

Complete information on the purification of oil, case histories of the employment of oil purification and full details on *Honan-Crane Oil Purifiers* are available. Just fill out and mail the coupon.



Illustrated at left is a Honan-Crane Liquid Clarifier which has proved extremely valuable as a filtration unit for many fluids. It employs metal cloth as a filtering medium and features automatic blow-down action to clear the filter screen. It removes even microscopic solids. If you have a fluid clarification problem, please outline it to us by letter—or better still, mail the coupon and allow us to send a sales engineer.

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You even know "KEX" WIPING TOWEL QUALITY ...in the dark!

THAT SMOOTH SOFTNESS . . . you can even tell in the dark . . . is the reason why you can use KEX Wiping Towels on the most delicate surfaces . . . without a worry. There isn't a hard seam . . . not a button . . . or a particle of hidden abrasive dirt . . . to scratch or mar the finest, most sensitive of precision instruments.

KEX Wiping Towels are uniform in size . . . big and tough enough for any wiping job . . . and usable right to the very edge. They are manufactured for the very purpose for which you will use them and are not cast-offs that have served other purposes. KEX Wiping Towels are always on hand when you need them . . . delivered on a regular schedule to fit your requirements. And *clean! They're absolutely clean* . . . made that way by a special, high heat process.

RENT KEX WIPING TOWELS AND SAVE MONEY!

Nothing to buy—no expensive inventory—just a low monthly rental. The very first month that you rent KEX Wiping Towels should show an appreciable saving on wiping costs.

For complete information, see classified section of your Telephone Directory for nearest KEX distributor, or write
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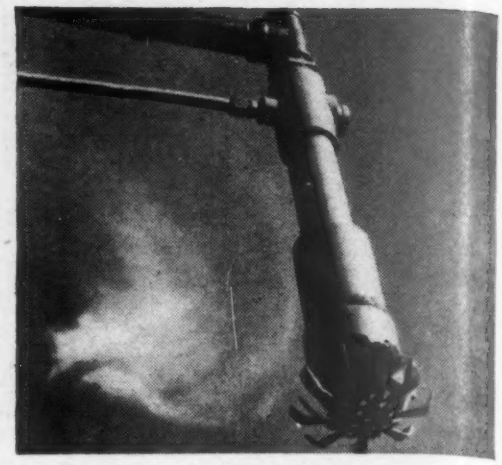
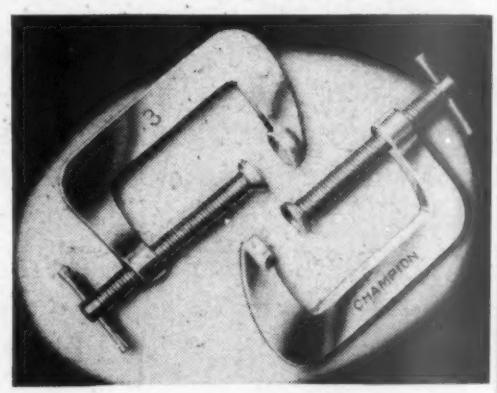


out the area to be protected. Foam may be supplied either from a fixed independent automatic unit, or through permanent standard piping with hose connections at the outer end hooked up with a foam truck. The spray deflectors are made in three standard sizes for four different water pressures. Equipment consists of a brass foam maker with a steel discharge tube and brass dispersion head. Although assembled vertically, the foam deflectors may be placed at different angles. National Foam System, Inc., 1400 Packard Bldg., Philadelphia 2.

C CLAMPS

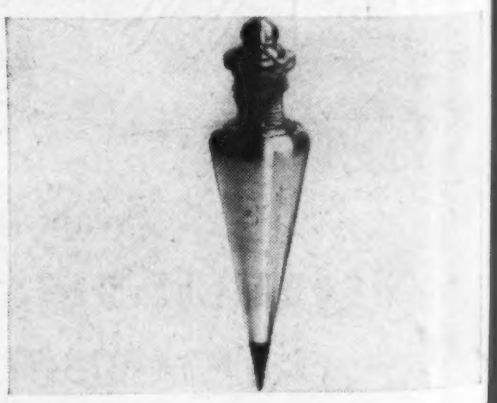
Named Champion, C clamps made of aluminum alloy are designed to provide maximum strength at the points of



greatest stress. Screws are steel precision cut, and bearings are machined. All sizes have sliding cross handles and heavy button tips for applying maximum holding pressure. Suitable for light duty, they range in size from 2½ opening inches by 1¾ depth inches to 6 by 2¾. The Western Tool & Mfg. Co., Inc., Springfield, Ohio.

PLUMB BOB

Equipped with rotatable reel and hook on top of neck, plumb bob is of simple construction, and has no parts to get out of order. Cord is reeled off to approximate length wanted, then slipped into hook, which holds the bob centered any-



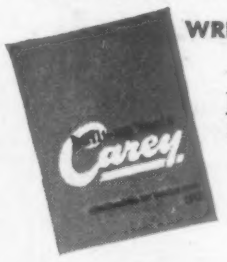
new specs for far-sighted planning!

Carey has added cold process built-up roofing for bonded roofs

If you are concerned with new flat roof construction, or with replacement, repair or maintenance of existing roofs, here's important news: A completely developed line of Cold Process Built-Up Roofings is now available from **CAREY.**

IN SHORT, you can get Cold Process Bonded Roofs from a manufacturer who already has more than 50 years experience in Hot Process Roofing. You can count on fast, economical, practical roof construction in areas where Hot Process equipment is unavailable... Cold Process Roofs can be applied on any type deck (bonded when applied by Carey Approved Roofers) ... no heating equipment necessary, no fire hazard to contend with. These Cold Process Asphalts are suitable for either mopping or spraying application, can be used with either rag or asbestos felts.

CAREY'S vast store of practical knowledge is available to help you solve *any* roofing problem. But even if you have none at the moment you'll want to ...



WRITE FOR YOUR FREE COPY ... of this information-packed booklet. It contains 35 detailed specifications for **CAREY** built-up, bonded roofs. Eight of its 24 pages deal with the new Carey Cold Process Bonded Roofs. You'll find it handy to have... a helpful reference book. A free copy is yours for the asking. Address your request to Dept. F-5.

Carey

THE PHILIP CAREY MANUFACTURING CO., CINCINNATI 15, OHIO

In Canada: The Philip Carey Co., Ltd.
Office and Factory: Montreal 1, P. Q.

Industrial Insulation • Rock Wool Insulation
Careyduct • Asbestos Wallboard & Sheathing
Asphalt Shingles & Roofings • Built-up Roofing
Roof Coatings & Cements • Pipeline Felt
Asphalt Tile Flooring • Waterproofing Materials
Expansion Joint • Asbestos Shingles & Siding
Corrugated Asbestos Roofing and Siding
Miami-Carey Bathroom Cabinets & Accessories

Titeflex ALL-METAL FLEXIBLE TUBING—TITEFLEX is the only pressure-tight flexible tubing made from metal strip which does not depend upon a sliding joint for flexibility. Its all-metal construction assures longer life, greater efficiency, and lower maintenance costs in conveying all types of liquids and gases.

Titeflex IGNITION SHIELDING—Widely praised for their performance on military aircraft during World War II, TITEFLEX Ignition Shielding systems are now available for all commercial aircraft, large or small. Complete unit assemblies or component parts for shielding any type engine can be supplied.

Waveflex FLEXIBLE WAVE GUIDES—The extreme flexibility of Waveflex permits confinement in "tight" corners without distortion of critical dimensions of size and shape. The precision construction reduces attenuation and preserves costly transmission energy.

Titeflex, Inc., maintains complete engineering and laboratory facilities for the development of new designs and applications. Ample plant capacity and highly perfected production equipment enables us to manufacture on a quantity and quality basis.

Our engineering and manufacturing facilities are at your complete disposal. Write for further information on your particular problem.

Titeflex, Inc. 505 Frelinghuysen Ave., Newark 5, N. J.

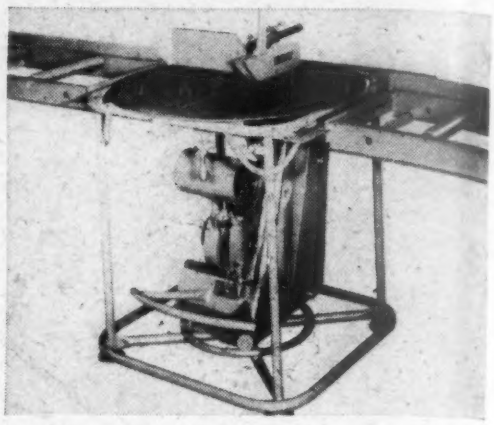
Exclusive Manufacturers of Titeflex high quality products for more than 30 years

Sales Offices { CHICAGO CLEVELAND DETROIT PHILADELPHIA LOS ANGELES TORONTO

where on cord. The bob can then be adjusted by rotating the spool. When not in use, spool and hook hold cord in place. Made of dense forged brass, with heat-treated steel point. Available in 10-, 12-, and 16-oz. sizes. Suverkrop Instruments, Box 436, Bakersfield, Calif.

PORTABLE POWER SAW

Table, saw arbor, and driving mechanism are combined in a single rotating unit in portable saw. Weighs 340 pounds, and is powered by standard gasoline engine power plant. Electric motors can



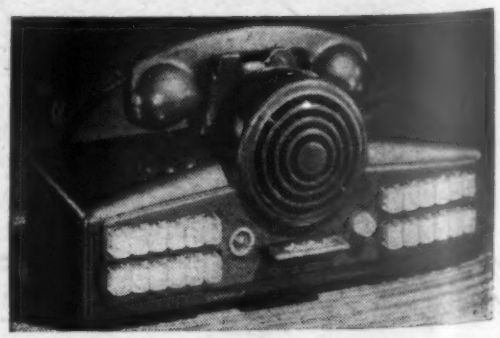
be furnished, if desired. The table can be rotated and locked in place to obtain the required cutting angle for ripping, cross-cutting, or mitering, without changing the position of the lumber, which is always kept lengthwise on the two 10x18 roller work tables. Counterbalanced blade falls away from the operator in any emergency. Actuated by convenient foot treadle, the saw has a cross-cut capacity of 4x4 or 3x12 inches, and can rip 4 inches deep and 40 inches wide. Nordberg Manufacturing Co., Milwaukee 7.

GRAVITY ROLLER CONVEYOR

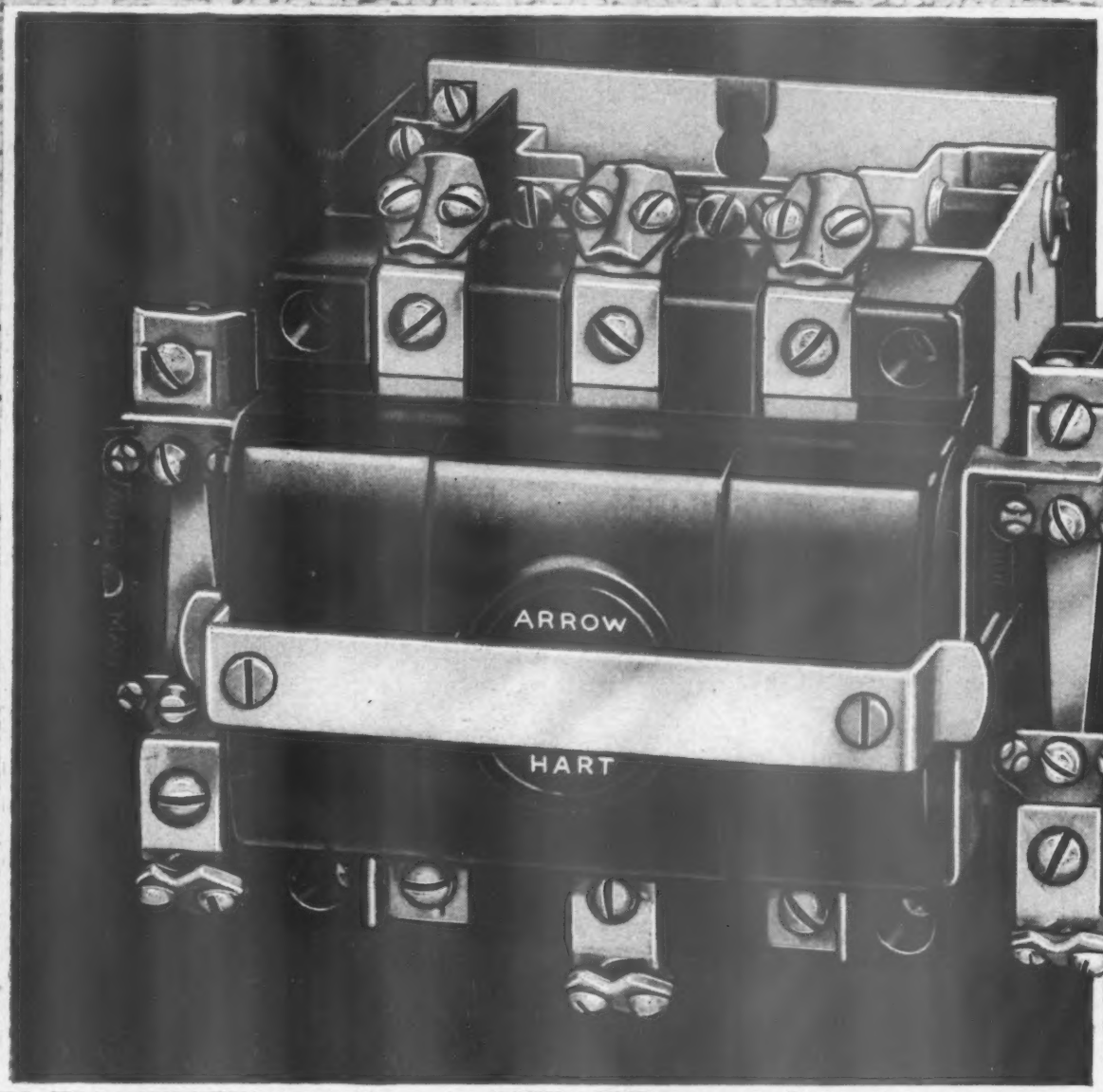
Stainless steel gravity roller conveyor is announced for use in damp locations. Channels, rollers, and roller ends are made of 18-8 stainless steel. Bearings use a stainless steel pin which turns in a bronze bushing, providing a lubrication-free installation. Conveyor is made in 10-ft. sections, and is 14 inches wide, with rollers located at 4-in. centers. The section weight is 123 pounds. Harry J. Ferguson Co., 145 West Ave., Jenkintown, Pa.

INTERCOMMUNICATION SYSTEM

Designated Amplicall, intercommunication systems are available with facilities for the use of up to 24 master stations, permitting as many as 12 conversations to be carried on simultaneously. Different combinations of master stations and substations may be obtained. The master



NEW MAGNETIC STARTER



SIZE 2; Type RA

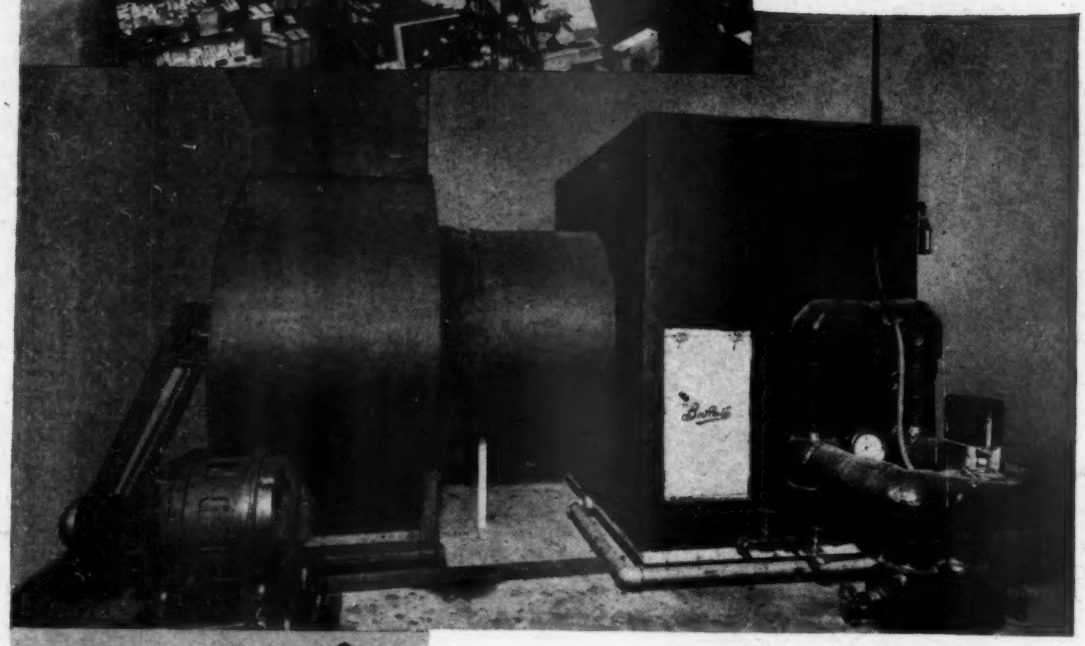
NEW-PRINCIPLE BALANCED MECHANISM provides full use of magnet power without lifting extra weight. Requires but 8.5 Watts closed, 75 Watts inrush. The straight-line horizontal action brings equal contact pressure to each pole. Efficient, durable to a new degree, — permitting a compact design about *half the size* of the conventional Starter for motors up to 25 H. P. . . Write for illustrated 4-page folder describing *all* new features.

ARROW AH HART

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD, CONN., U. S. A.

KEEPING COOL *in a* HOT SPOT

This modern store is cooled in summer, heated in winter with Buffalo Comfort Conditioning Equipment shown in other picture.



"Buffalo"

SEE YOUR CONSULTING ENGINEER ABOUT *Air Conditioning*

His knowledge of equipment, required capacities and duct layout can save time and money for you.

COMFORT COOLING EQUIPMENT

Are "hot spots" in your store, plant and offices robbing personnel of comfort . . . health . . . *efficiency*? Management in many cases has reduced absenteeism, slow-ups, production errors, other industrial relations tie-ups . . . through installation of "Buffalo" Air Conditioning Equipment.

"Buffalo" Air Conditioning Units are available to you in a wide variety of capacities to give you the *right* unit for your particular floor area. All are easily installed, economical to operate. They clean, cool, dehumidify, heat and humidify, according to requirements.

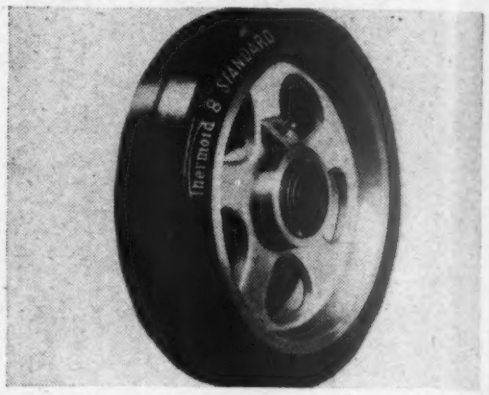
We invite you to see what a *comfortable difference* "Buffalo" can make in your air. For all details, simply write:

BUFFALO FORGE COMPANY
471 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

station unit can be supplied with or without handset (for private conversation). Features include visual busy signal, individual locking-type push-buttons for station selection, illuminated "on-off" volume control, plug-in cable connections, and a balance line wiring system, which is said to reduce cost of installation and to prevent cross-talk. The Rauland Corp., 4245 North Knox Ave., Chicago.

RUBBER-TIRED WHEEL

Lightweight wheels, ranging in size from 6 to 12 inches, and in load rating from 480 to 1200 pounds, are made of tough aluminum alloy castings with



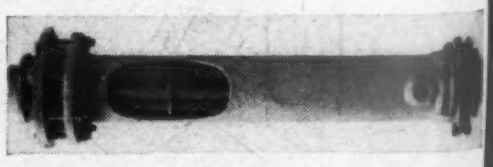
oversized ball bearings and built-in grease seals. Have large grease reservoirs, equipped with standard grease-gun fitting. The rubber tread is smooth and cut-resistant. Sizes are 6, 8, 9, 10, 12 inches. Thermoid Co., Trenton, N. J.

RESISTANCE WELDING CONTROL

Line of non-synchronous packaged a.c. resistance welding controls, known as Weld-O-Timer, permits hundreds of combinations for sequencing and timing from four factory-wired subassemblies and two supplementary subassemblies, maker states. Made in two frame sizes, the 1200 and the 600, the controls can be side-mounted to the welder, or floor-mounted next to the welder, or mounted away from the welder with adjustment controls at the welder. Each job can be set with convenient fingertip control. Voltage regulator tubes are incorporated in timing circuits, and an access door protects control setting. Westinghouse Electric Corp., P.O. Box 868, Pittsburgh.

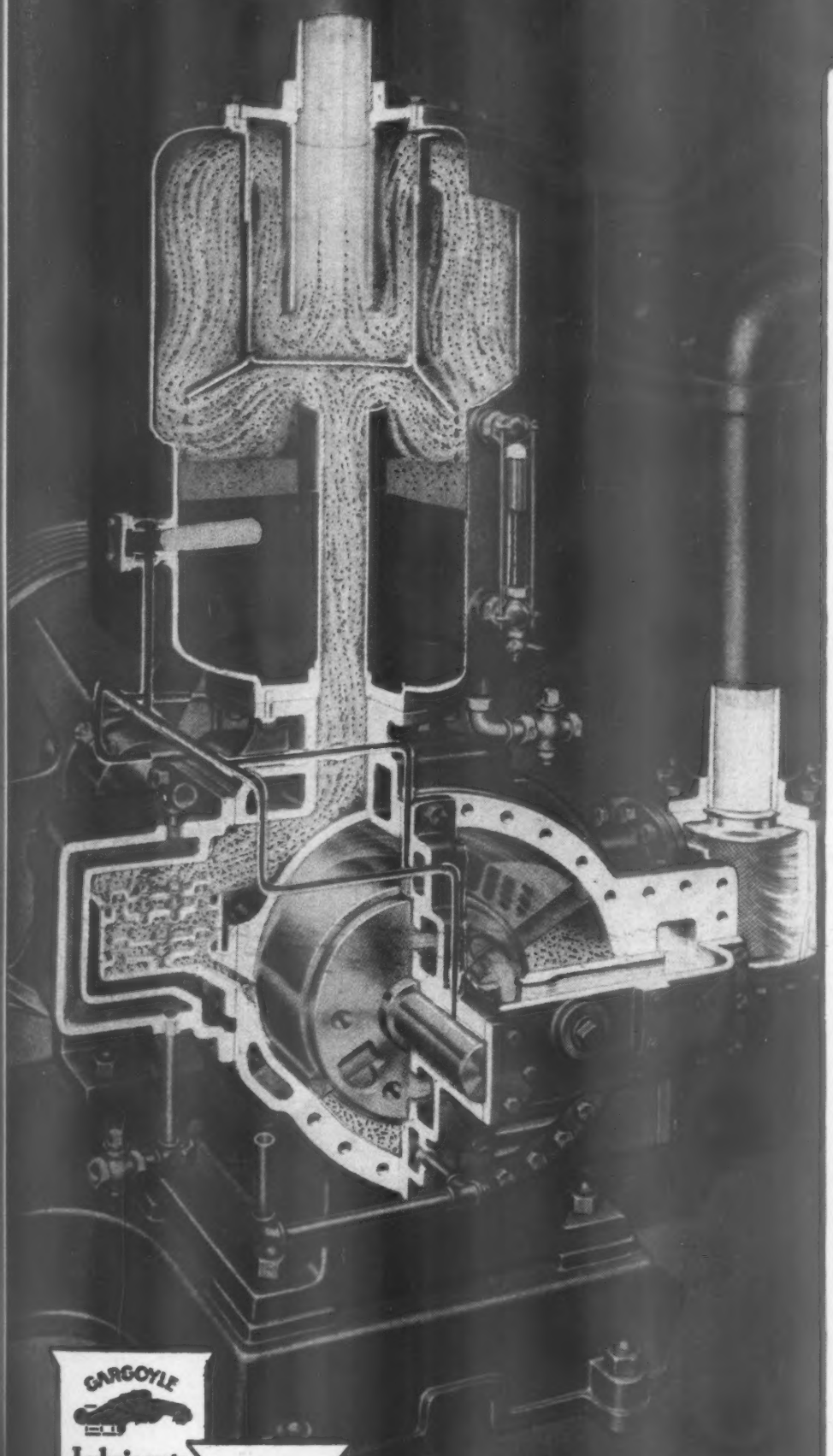
HEAT EXCHANGER

Seven-tube "Karbate Impervious Graphite" shell and tube heat exchangers in standard sizes of 4 feet 3 inches, 7

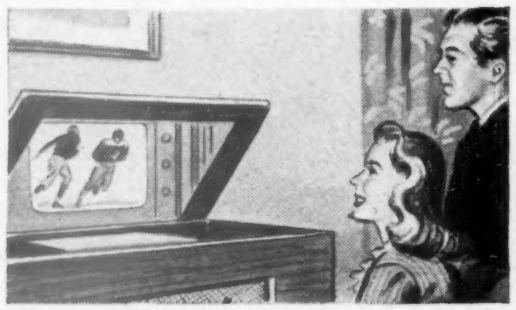


feet 3 inches, and 10 feet 3 inches long, can be employed as heaters, coolers, boilers, or condensers. Operated vertically or horizontally, they carry temperatures up to 338 deg. F. (170 deg. C.), and a working pressure of 50 p.s.i. on both the tube and shell sides. Standard nozzle connections permit installation with piping of almost any material, and water, brine, or steam are suitable on the shell side. Tube sheet, dome, and nozzle

How to Make Nothing—Fast!



Better Tubes for Television Made Possible by a New Oil



A Socony-Vacuum "INSIDE STORY"

HERE'S ONE WAY to make nothing... and make it fast. This machine is a high vacuum pump. It takes the air out of television tubes and light bulbs.

See that whirling rotor? As it turns, those sliding vanes suck in air through the pipe at the right from the tubes that are being evacuated. This sucking creates the required higher vacuum.

Strange Conditions for Oil

Ingenious—yes! And the present high efficiency of this pump is made possible by a combination of the unique pump design and the use of a new special oil by Socony-Vacuum . . . an oil that resists physical change under the strange working conditions inside a vacuum. The result...now operators can obtain desired vacuums much faster . . . can turn out more and better vacuum tubes.

Solving unique problems like this is only one phase of Socony-Vacuum Correct Lubrication. Less spectacular, but equally important, is our complete program for every machine you operate.

SOCONY-VACUUM OIL CO., INC.
and Affiliates: Magnolia Petroleum Company
General Petroleum Corporation

TUNE IN THE MOBILGAS PROGRAM
MONDAY EVENINGS, 9:30 E.D.T.— NBC

This illustration prepared with cooperation of Beach-Russ Company

GARGOYLE Lubricants

SOCONY-VACUUM

The inside track to profits...

SOCONY-VACUUM CORRECT LUBRICATION

Materials Handling Costs Are
An Important Part of Product Costs
Breakdown of a Typical Product Cost
MACHINING & PROCESSING
MATERIALS & PARTS
ASSEMBLY & INSPECTION
OVERHEAD
MATERIALS HANDLING
RECEIVED MATERIALS CONVEYED TO STORAGE
FROM STORAGE TO PRELIMINARY FABRICATION
TO FIRST PRODUCTION DEPT
TO TEMPORARY STORAGE
TO FIRST MACHINING OPERATION
TO SECOND MACHINE OR PROCESS OPERATION
TO THIRD MACHINE OR PROCESS OPERATION
TO PARTS INSPECTION DEPARTMENT
TO SUBASSEMBLY
TO SUBASSEMBLY INSPECTION
TO FINAL ASSEMBLY LINE
CONVEYED ALONG ASSEMBLY LINE
TO FINAL INSPECTION
TO PACKAGING DEPARTMENT
TO WAREHOUSE
TO SHIPPING PLATFORM
This Chart from MILL and FACTORY—by Special Permission of Publishers

Generalift ★ ★ ★ ★ ★

PALLETS

• One of the most "alive" subjects in the field of materials handling is the use of pallets. Palletized handling cuts costs. Palletized handling speeds production.

Generalift pallets and skids are tough and long lasting—made from sturdy hardwood—assembled with drive screw or ring shank nails. Stringers are flush or set in and special chamfering is available if needed.

Generalifts are manufactured in your sizes—prompt shipments. Call or write our nearest office for prices.

ENGINEERED SHIPPING CONTAINERS

25 YEARS YOUNG
1922·1947

General BOX COMPANY

GENERAL OFFICES: 504 N. Dearborn St., Chicago 10, Ill.

DISTRICT OFFICES AND PLANTS: Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon, Natchez.

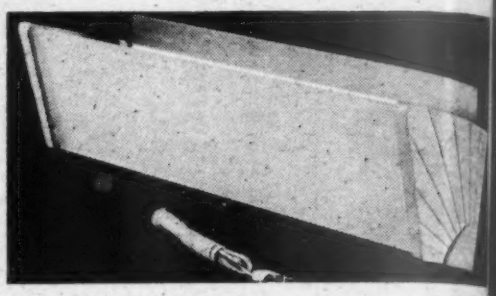
Continental Box Company, Inc.: Houston, Dallas.

ECONOMIZE . . . PALLETIZE . . . GENERALIZE!

are combined in one monolithic piece. National Carbon Co., Inc., 30 East 42nd St., New York 17.

GERMICIDAL FIXTURES

Designed to provide protection against airborne diseases, five models of germicidal fixtures are said to utilize potent ultraviolet radiation to kill airborne germs, viruses, and mold-forming spores



of many contagious diseases. Called Protect-O-Ray, two are wall units for upper air disinfection, one overhead unit combines germicidal radiation with fluorescent lighting, one plastic- housed portable unit is for localized application, and two open-type portable units are for individual room sterilization, and use in walk-in refrigerators and food storage rooms. Lustra Corp. of America, 40 West 25th St., New York 10.

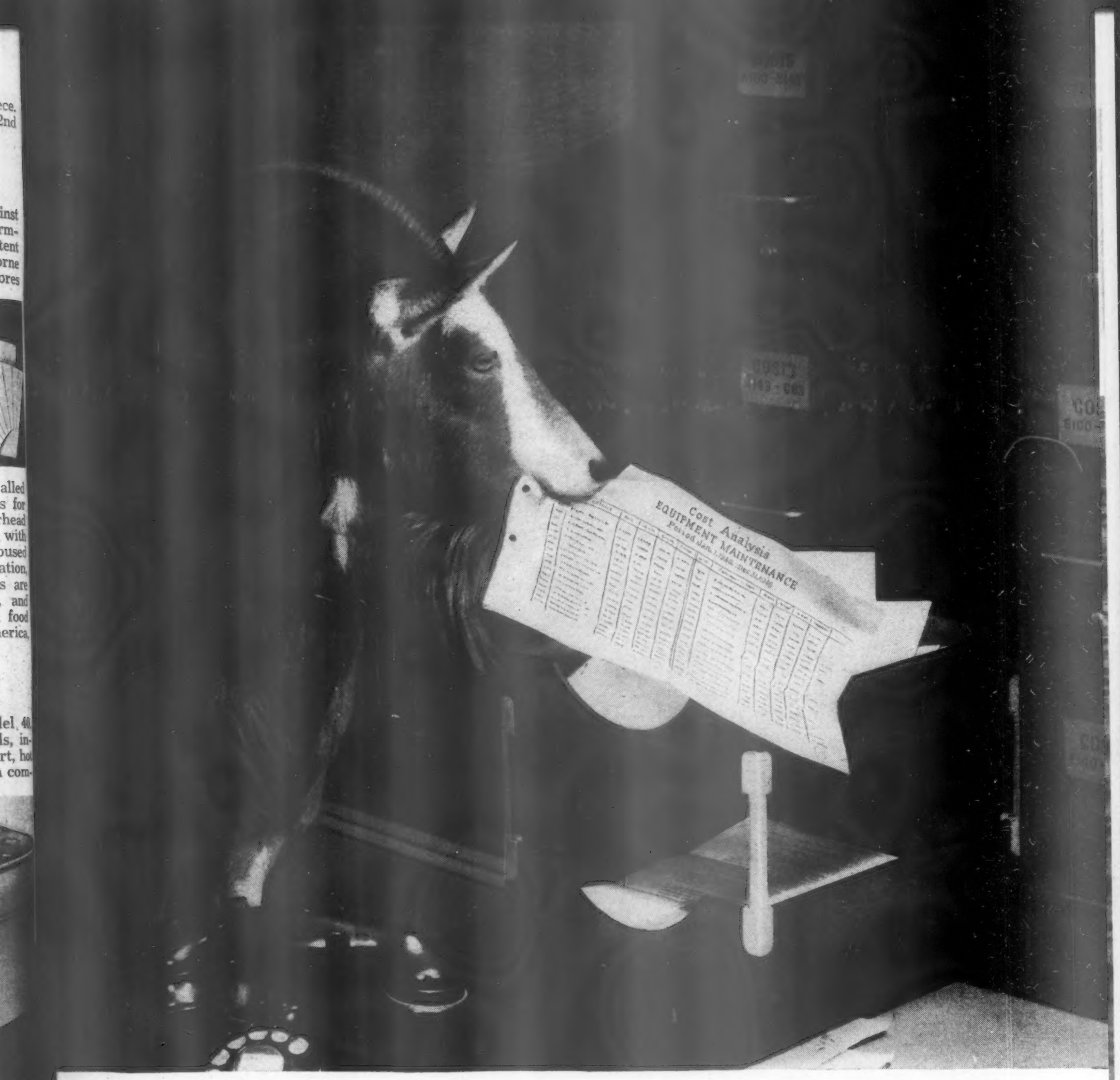
FOOD CART

Mobile food cart, known as Model 40, dispenses 40 full-course hot meals, including entree, warm bread, dessert, hot (or cold) beverage, and soup; or a com-

bination of 40 hot meals and 60 light lunches. Each meal remains sealed in individual stainless steel, insulated containers, keeping it hot for two to three hours after preparation. The hand-cart is of lightweight aluminum alloy construction with rubber-tired casters. Mealpack Corp. of America, 152 West 42nd St., New York.

RELIEF VALVE

Simplified relief valve, for pressures up to 10,000 p.s.i., is fabricated from bar stock, either bronze, cold-rolled steel, or stainless steel, depending on requirements. Disk and nozzle are stainless steel. Available with or without test gear, in ½-, ¾-, and 1-in. sizes. Interchangeable nozzle inserts provide for proper capacity at set pressures in three ranges—2000, 5000, and 10,000 p.s.i. for each size. Top-guided disk piston with two-point bearing surface is free acting. High carbon steel loading spring is e



"Today's Maintenance Costs Ain't Hay, Either!"

recent months there's been many a plant engineer who has added up valve ntenance costs, glanced at the total aid, *"Whew . . . that ain't hay!"* ld figures reveal large totals which that, with higher wages and material it just isn't economical to nurse in- valves along. And the same figures many a valve now in service whose p would exceed the cost of a new —a dependable Jenkins Valve!

en you install Jenkins Valves you e sure you're cutting maintenance costs right down to rock bottom—for superior design, materials, and workmanship make Jenkins Valves the longest-lasting, most trouble-free valves that money can buy. Almost a hundred years of service in industry and in commercial buildings have proven this fact—yet you pay no premium for Jenkins extra quality. Sold through reliable Industrial Distributors everywhere.

Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

LOOK FOR THIS TRADE JENKINS MARK DIAMOND MARK

SINCE *Jenkins Bros* 1864

JENKINS VALVES

Types, Sizes, Pressures, Metals for Every Need

WITH AN EYE ON PRODUCTION *Costs*

AND PRODUCTION *Volume*

ACETYLENE COUPLING

OXYGEN COUPLING

HANSEN COUPLINGS

SAVE TIME . . . CUT COSTS

◆ It's the minutes saved on operations repeated many times daily that mount up to substantial savings in time . . . and money. With Hansen Couplings, connections and change-overs become a matter of seconds with no hold-up of costly operations.

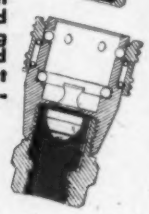
To connect a Hansen coupling, you merely push plug into socket. To disconnect, slide sleeve back with thumb. In both cases, flow is immediately and automatically turned on or off . . . with no time wasted, no losses.

There is a specific Hansen coupling, made for air, oil or grease, for oxygen, and for acetylene. Available in a wide range of standard sizes.

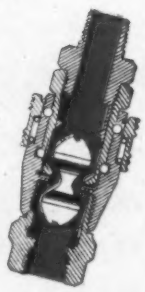
Write for catalog describing full line of Hansen couplings and fittings for industrial use.

The Hansen Two-Way, Shut-Off Coupling.

Red section shows how rubber washer in valve stem contacts valve seat in both plug and socket, sealing both plug and socket against leakage instantly.



Red section shows flow of liquid or gas around spool section of valve, permitting free flow of liquid or gas through coupling instantly upon connection.



REPRESENTATIVES

New England States: A. D. GEIGER, Belmont, Mass.

Eastern, Southern States: B-R ENGRG. CO., Baltimore, Md.

Northern Ohio: F. & W. URSEM CO., Cleveland, O.

Southern Ohio, West Va., Ky.: STEINHAGEN AIRLINE PRODUCTS, Dayton, O.

Northern Ill., Eastern Iowa: NORRIS ENGRG. CO., Chicago, Ill.

Indiana, Wisconsin: NEFF ENGRG. CO., Ft. Wayne, Ind.

Central Western States: JOHN HENRY FOSTER CO., St. Louis, Mo., Minneapolis, Minn.

Western, Southwestern States: BURKLYN CO., Los Angeles, Calif.

Northern Calif., Nevada: H. E. LINNEY CO., Oakland, Calif.

Michigan: WM. H. NASH CO., Detroit, Mich.

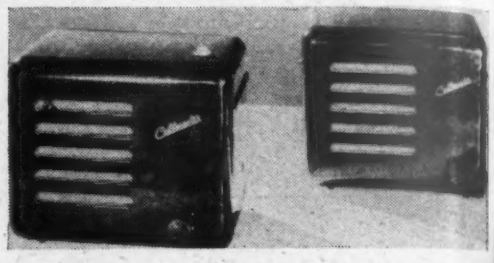
THE HANSEN MANUFACTURING CO.

1786 EAST 27th STREET • CLEVELAND 14, OHIO

closed, and nozzle seat is well above the drain line. Farris Engineering Corp., 531 Commercial Ave., Palisades Park, N. J.

INTERCOMMUNICATOR

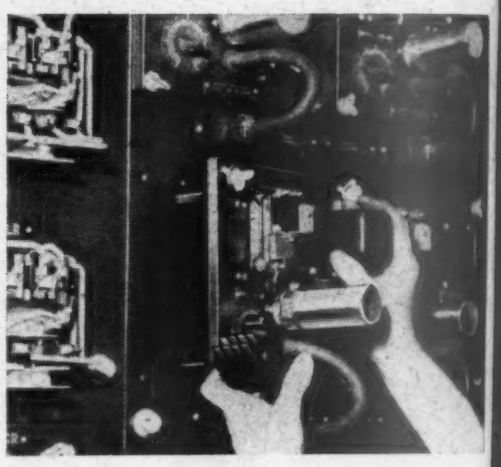
Housed in mahogany plastic cabinets, 1947 model Callmaster electronic intercommunicator is said to feature improved



sensitivity and power output. Model CM-10 is a "master and sub" combination, and provides a means for two people at separate locations to talk back and forth. Furnished as a packaged unit. Lyman Electronic Corp., 12 Cass St., Springfield, Mass.

ELECTRONIC CONTROL PANEL

Heavy-duty "Quick-Change" electronic control unit panel is built for rapid servicing. Captive wingnut mounting and



multiple contact plug arrangement permit substitution of a spare panel at any time to provide virtually uninterrupted machine operation whenever removal of the unit is necessary for testing or servicing. Available in a range of manufacturer's electronic equipment. Cutler-Hammer, Inc., 253 North 12th St., Milwaukee 1.

PORTABLE ELEVATOR

Lightweight portable elevator handles dies, heavy tools, toteboxes, weighing up to ½ ton. The maneuverable machine has a 22x24-in. platform, and over-all height for clearing doorways is 68 inches. It has a lift of 55 inches, and is equipped with a floor lock and swivel casters at the hoist end. "Crank-up, crank-down" hoist prevents gravity drop. The end of the cable can be placed either on the top of the machine for 2-part arrangement, or directly on the platform for elevating half the load. Also can be wound around a box or other package to drag it on the platform by cranking. Revolvator Co.

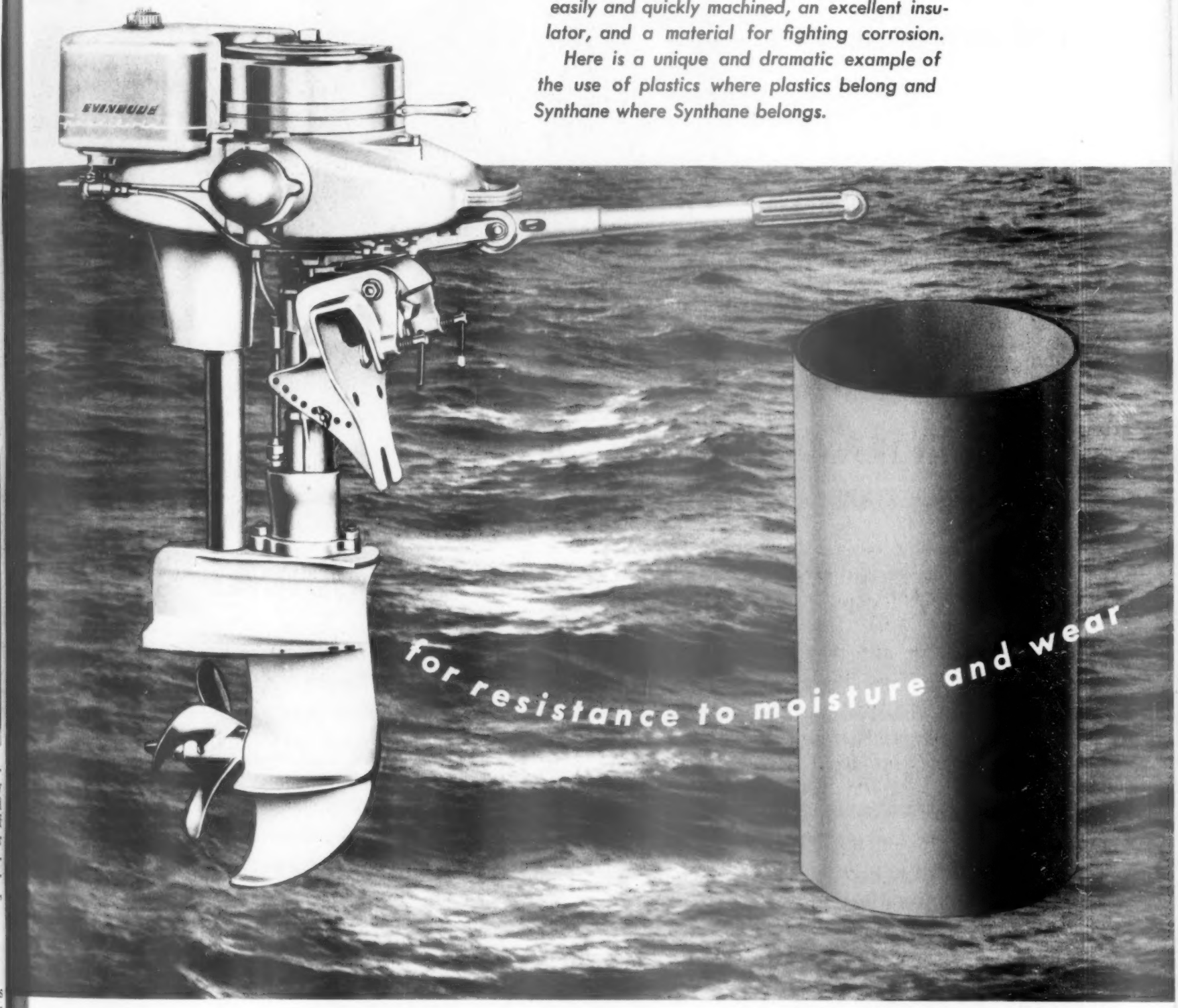
LIFT TRUCK DRIVE

Gas-electric drive for motorized hand-lift trucks features a "walking speed control," providing three speeds which

Plastics where plastics belong

A rare combination of mechanical, electrical, and chemical properties fit Synthane (our type of plastic) for a countless number of useful applications. Aside from its moisture and wear resistant qualities, Synthane is also light, dense, strong, easily and quickly machined, an excellent insulator, and a material for fighting corrosion.

Here is a unique and dramatic example of the use of plastics where plastics belong and Synthane where Synthane belongs.



This outboard motor pivot bearing (above) requires no lubrication . . . resists both salt and fresh water, wears long and well . . . it's Synthane.

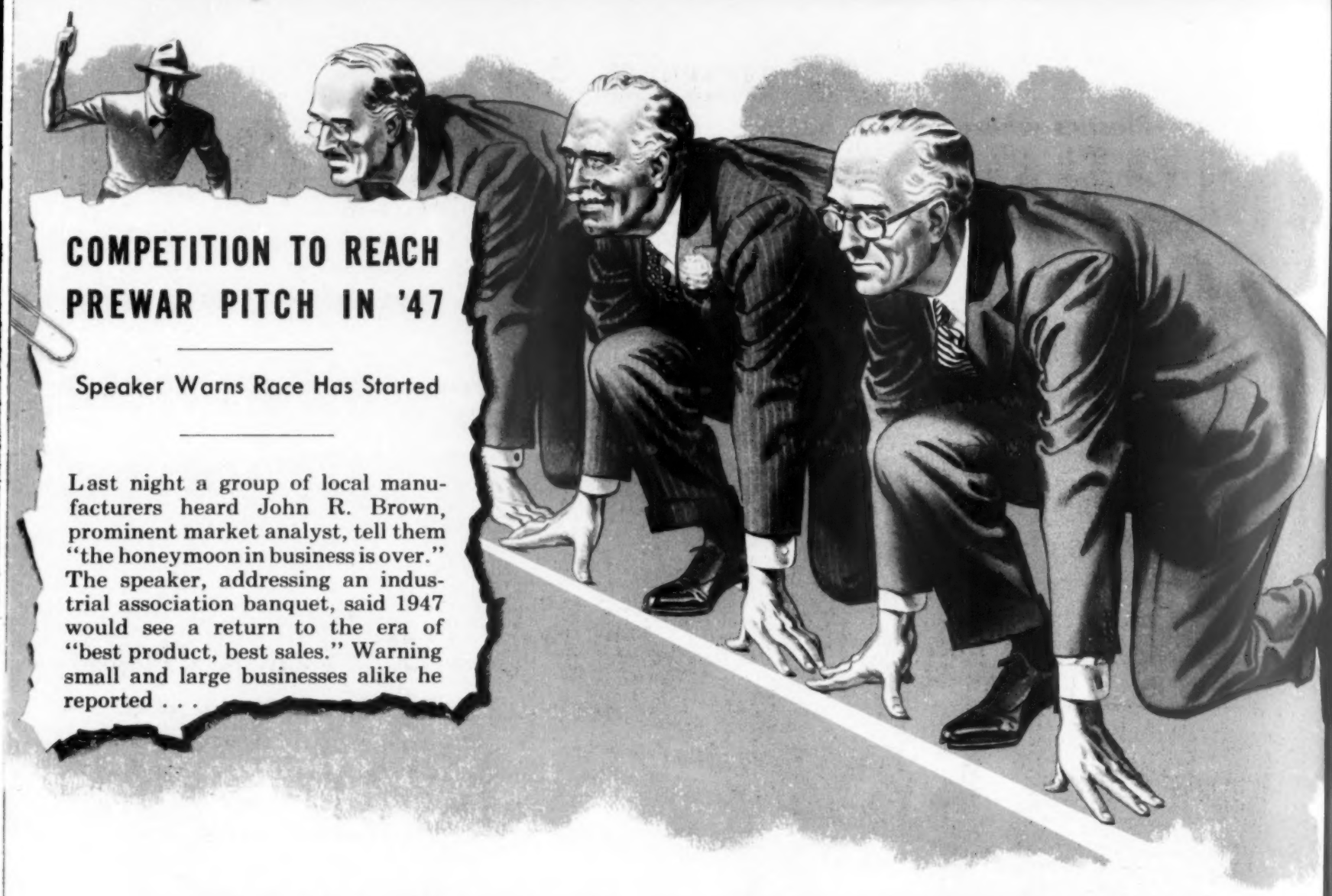
If these few of Synthane's many properties suggest a possible use of Synthane in your product, let us help you — in the design stage. Perhaps we can save you time and money. Meanwhile, get further information. Send today for the complete catalog of Synthane technical plastics. Synthane Corporation, 4 River Road, Oaks, Pennsylvania.

SYNTHANE

where Synthane belongs

DESIGN · MATERIALS · FABRICATION · SHEETS · RODS · TUBES
FABRICATED PARTS · MOLDED · MACERATED · MOLDED-LAMINATED

(over)



COMPETITION TO REACH PREWAR PITCH IN '47

Speaker Warns Race Has Started

Last night a group of local manufacturers heard John R. Brown, prominent market analyst, tell them "the honeymoon in business is over." The speaker, addressing an industrial association banquet, said 1947 would see a return to the era of "best product, best sales." Warning small and large businesses alike he reported . . .

READY FOR THE "PROFIT HANDICAP"?

Cost-plus thinking and easy profits have reached the end of their rope according to all business barometers. Business is once again off to a free enterprise race.

Better products for less manhours and lower costs are now interesting production managers, product engineers and purchasing agents and they are showing intense interest in methods and materials that promise these improvements.

Synthane (our type of laminated plastics) is made to order for current designing. Its combination of properties, makes it applicable to literally thousands of uses. It is, for example, one of the best of electrical insulators. It is also moisture, corrosion and wear resistant, possesses high mechanical strength and can be quickly and easily machined.

Synthane may help solve one of your product problems. If you feel you have a use for Synthane, let us help you before you design. We may be able to save you time, effort and money and help put you "out in front" of competition. Send the coupon below for your copy of the Synthane Plastics Catalog.

Here's how to get a "Head-Start" on Competition

SYNTHANE CORPORATION, 4 RIVER ROAD, OAKS, PA.

Gentlemen:

Please send me without obligation the complete catalog of Synthane technical plastics.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

SYNTHANE

PLAN YOUR PRESENT AND FUTURE WITH SYNTHANE TECHNICAL PLASTICS • SHEETS • RODS • TUBES • FABRICATED PARTS • MOLDED-LAMINATED • MOLDED-MACERATED

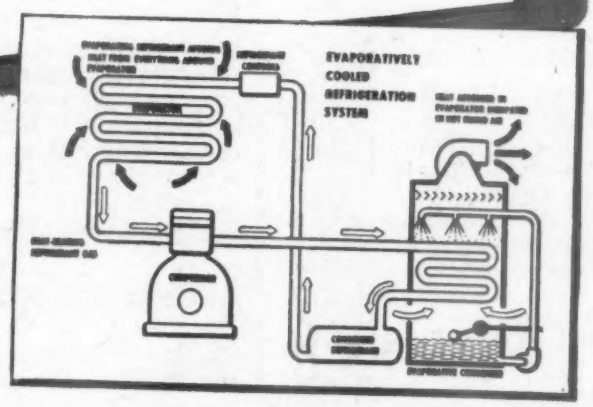
14 ways to IMPROVE PRODUCTION

...cut overhead by Refrigeration and Air-Conditioning

FREE *General Electric booklet tells how* modern refrigeration methods are *saving money* for many important industries. New applications are being discovered every month. Read how your firm may use one of these methods to eliminate production bottlenecks, cut down costs.

EXAMPLE A

A manufacturer of lock washers cut water consumption for cooling to less than 10% by using General Electric Evaporative Cooler.



Diagrams such as this . . . plus installation photographs.

Discusses complete Plant Air Conditioning. In addition to process refrigeration, "NEW INDUSTRIAL DIMENSIONS" shows how modern firms have completely air conditioned their plants to improve production. Shows, too, how dehumidification has helped in the handling of blueprints, manufacture of precision parts and other phases of manufacture.

General Electric Engineering Illustrated. Each application is clearly illustrated with a photograph of the actual installation. In addition, simple diagrams depict the most frequently used systems of refrigeration and air conditioning.

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- Jacket Water Cooling
- Cooling Mobile Equipment
- Complete Plant Air Conditioning
- Process Refrigeration

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Air Conditioning Dept., Section 7725
General Electric Company, Bloomfield, N. J.

Please send me FREE a copy of "New Industrial Dimensions," the General Electric Booklet giving valuable information on refrigeration and air conditioning.

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No, he's not washing the floor . . .
he's *hardening* it with

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to save it from concrete dusting and disintegration

LAPIDOLITH *Liquid* (patented) thoroughly hardens concrete floors for heavy-duty service without interrupting work schedules . . . saves the cost and inconvenience of patching and retopping.

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LAPIDOLITH penetrates quickly and deeply, reacting with the lime in the cement to form a close-grained, granite-like surface 10 times harder than untreated concrete. Dusting is eliminated; danger from alternate freezing and thawing minimized; floor protected against action of oils and many chemicals. Excellent for terrazzo floors, too.

EASY TO APPLY

Lapidolizing is just as *easy* as washing a floor. The first treatment is the only treatment—the first cost is the only cost. In fact, the results gained with LAPIDOLITH cost less than any other known method of dustproofing and wearproofing floors!

More facts in SWEET'S, or write Dept. F-5, for illustrated brochure packed with floor-saving information.

You can do this to many untreated concrete floors, but not to a Lapidolized floor!

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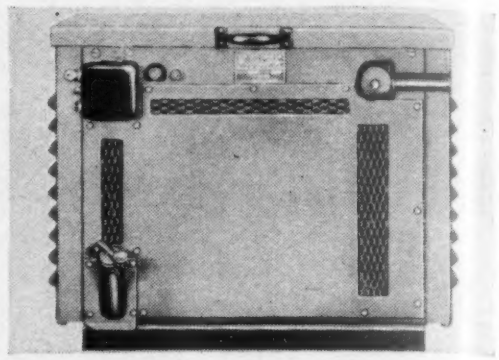
Building Products Division, **L. SONNEBORN SONS, INC.,** New York 16, N. Y.

In the Southwest: Sonneborn Bros., Dallas 1, Texas



are independent of the control mechanism of the truck. Housed in a heavy steel enclosure and powered by a 4-cylinder, self-starting gasoline engine, the unit weighs 600 pounds, and requires a space approximately 14x24 feet by 32 inches. Ready-Power Co., 3826 Grand River Ave., Detroit.

LIFT TRUCK CLAMP

Handling crates stacked 7 to 9 feet high, two rows deep, without need for a pallet, clamping device known as Clamp-Lift is designed for use on gas and battery-powered Tructractor model Clipper and

Trucloader fork trucks. Lifting height is limited to 84 inches. The Elec-Trucloader can be equipped to handle 9 to 11 boxes high, but lift is restricted to 6 inches. Squeezer arms of the lift truck accessory are hydraulically actuated, and sharp metal pins on inside surfaces grip the bottom row of crates. The load is steadied by an adjustable rack which rests on top of the stack. The clamp unit is suitable for handling any boxes or crates from 22 to 28 inches wide that are strong enough to withstand 300-lb. pressure. Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.

ALUMINUM ROOF COATING

Rayflec "asbestos-fibered" aluminum roof coating is said to reflect up to 80 per cent of destructive sun rays, lowering summer temperatures under the roof from 10 to 15 degrees. Prevents peeling, blistering, and "alligatoring." Inter-Coastal Paint Corp., 1248 Walnut St., East St. Louis, Ill.

HYDRAULIC CYLINDER VALVE

Four-port hydraulic cylinder valve, suitable for controlling all types of reciprocating hydraulic cylinders, obtains full reversal actuation from the cylinder itself. Includes positive mechanical shutoff, and reverse lever can be moved to any position without caus-

"We Save up to 30% of Production Time

WITH WALKER-TURNER DRILL HEADS IN SPECIAL JIGS"... *Wright Aeronautical Corp.*

"To eliminate costly setup time, a number of small individual jig-drill combinations employing Walker-Turner standard drill units costing $100 to $400 have been installed.

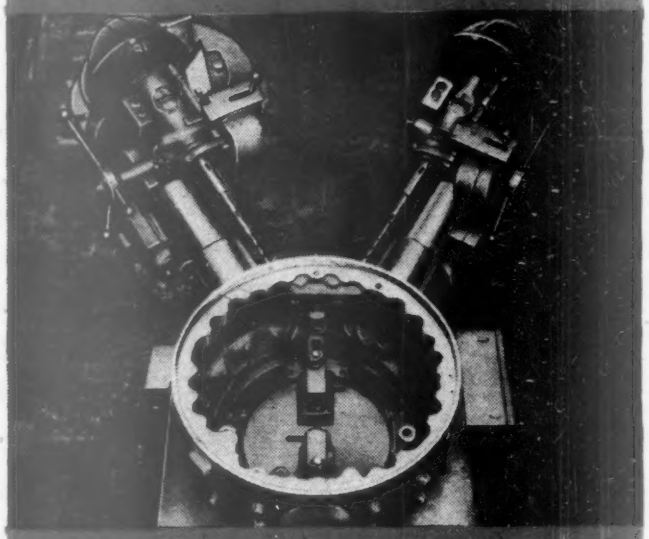
"Housing sections of the Wright Cyclone engine require hundreds of holes of various depths, diameters and angles. With this installation the changing of jigs and fixtures becomes unnecessary.

"PRODUCTION SCHEDULES ALLOWED AS MUCH AS 30% OF TOTAL OPERATION TIME FOR THIS SETUP PROCEDURE. This new method eliminates setup and the possibility of error is reduced.

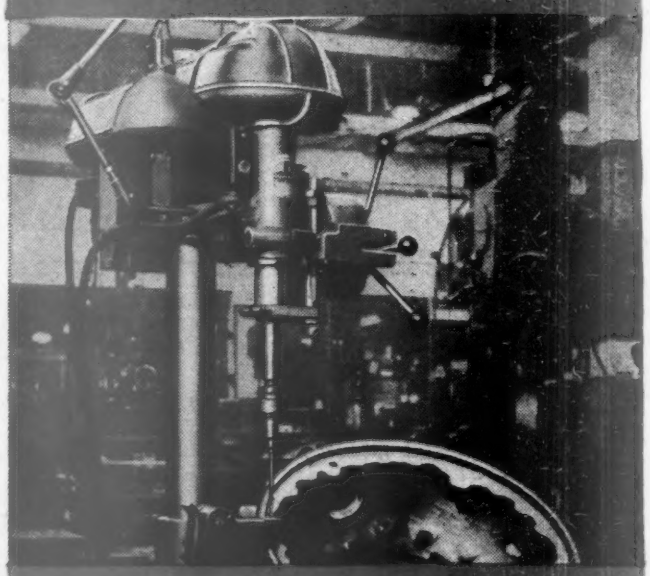
"We now have more than 30 special jig-drill setups employing Walker-Turner Drill Heads in this plant all working to our complete satisfaction."

E. PRANGE, *Supervisor*
Process Engineering
Wright Aeronautical Corp.

Operating on the bottom of the workpiece, two Walker-Turner 20" Power Feed Drill Presses are used in this installation.



By placing two Walker-Turner 20" Power Feed Drill Heads in a horizontal position, loading of the cumbersome workpiece is greatly facilitated.



Two angular oil passages drilled into distributor pads with Walker-Turner 20" Power Feed Drill heads.

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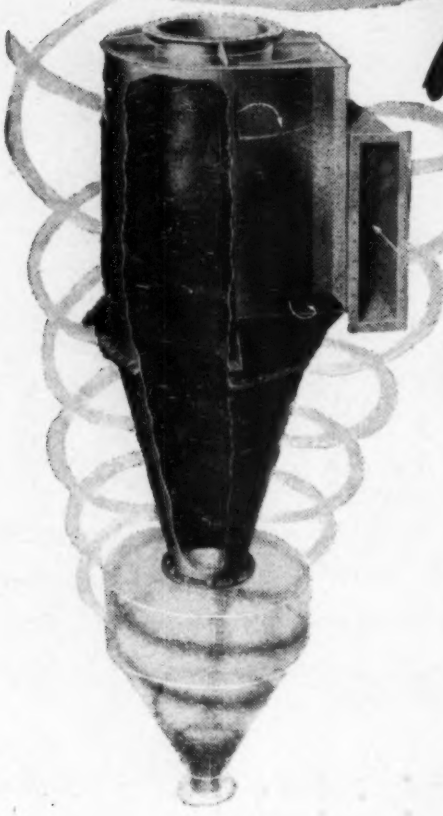

the crux of dust separation

"Know Your Dust," says Buell. 999 times out of a thousand, the percentages of various micron sizes establish a complex separation problem. To anticipate satisfactory separation you must know with just what efficiency your collection apparatus will handle each of the different size particles present.

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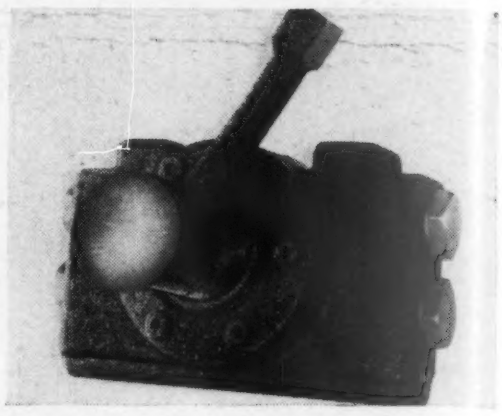
Engineered Efficiency IN DUST RECOVERY



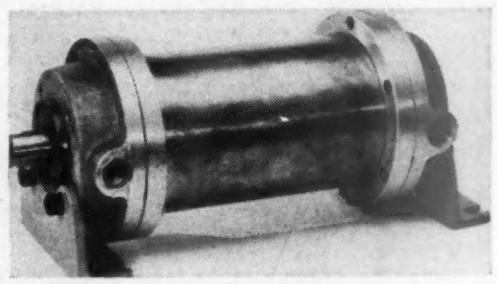
ing cylinder movement or creep. Internal mechanism operates under pressure balances; no springs are used. Specifications: Operating pressure 50 to 300 p.s.i.; pipe sizes ⅛ to 1 inch; four pipe connections; speed up to 500 cycles per minute; mounting supplied in flange, bracket, or face types; "O" type packings are standard, but other types can be furnished; and special models of the valve can be supplied to requirements. Morse Boulger Destructor Co., 205 East 42nd St., New York 17.

HEAVY-DUTY CABLE

Said to be one-fifth the weight of chain of equal strength, and to have a minimum breaking strength of 20,000 pounds, the Bulldozer Tenton all-purpose cable will handle 4000-lb. loads safely under all towing conditions, according to the manufacturer. Made of galvanized flexible wire rope, with heat-treated aluminum alloy thimbles held by Pres-Tite cable connectors. Each thimble fits through the other, permitting the cable to be used as a slip noose. Can also be furnished with a sliding choker hook. Comes in standard lengths of 10, 12, 15, 20, and 35 feet. Wire & Cable Div., Wind Turbine Co., West Chester, Pa.

AIR CYLINDER

Model CA pneumatic cylinders for holding and tooling operations operate on either air or hydraulic pressures up to 300 pounds. Cylinders have adjustable



cushions at both ends. Sturdily constructed with diversified and interchangeable mounting, and heads and inlets rotate to any desired position. They other sizes may be obtained. Hy-Matic, are available in 2- to 8-in. diameters, but Inc., 717 West 11th St., Los Angeles 15.

VISE

Double cam-actuated vise centers the work to the drill or cutter regardless of the dimensional variation of the piece. Features one-hand operation and locking. The frame and carriage are machined from iron castings, and the alloy steel cam plate is machined after heat-treating. There are no bearings to lubricate. A 3-in. opening through the center

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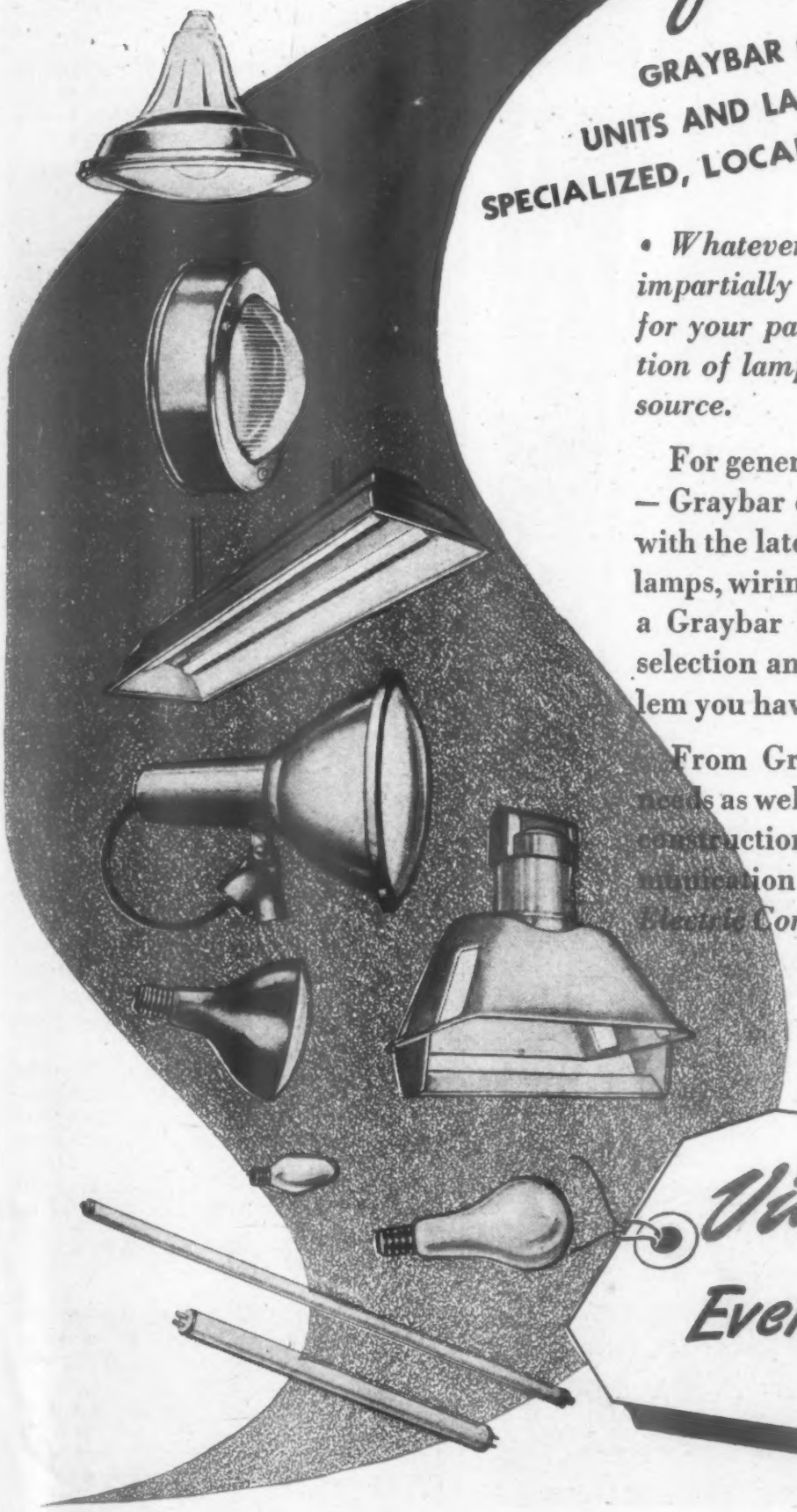

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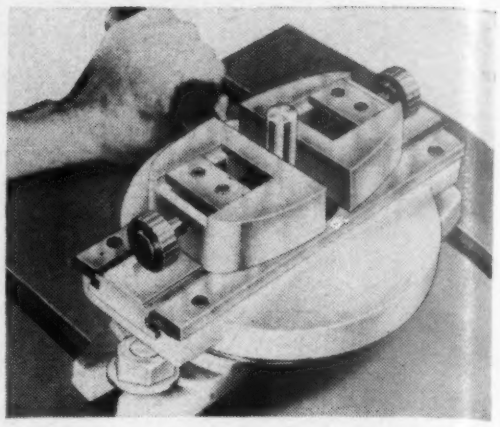
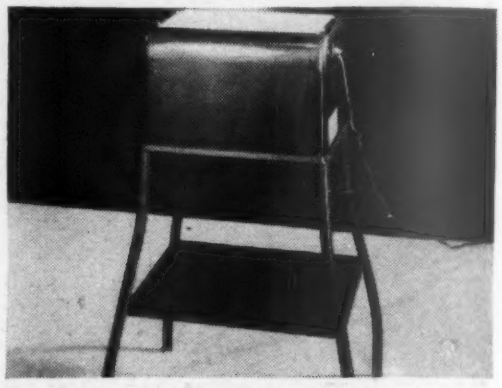


allows the work and chips to fall clear when cam lock is released with suitable clearance for placing a work-tray or chute under the vise. The Williams Products Co., Middletown, Conn.

HUMIDIFIER

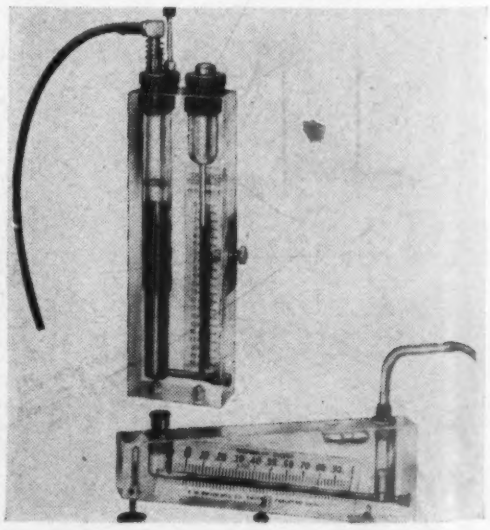
Constructed to overcome dryness of the air in a work area up to 8000 cubic feet, humidifier, known as Misticaire, is self-contained and portable, supplied with or

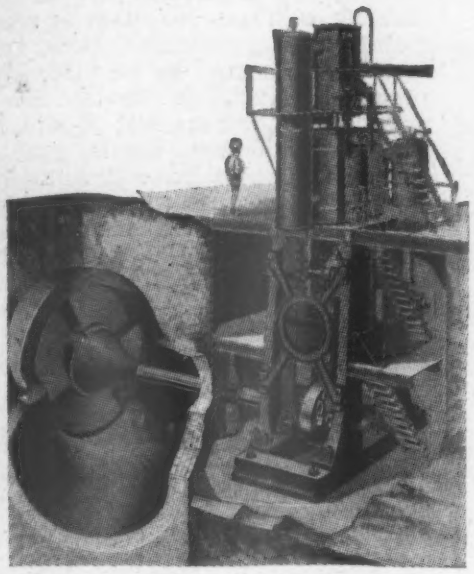


without stand. Eliminates use of a fan or other moving parts. Vaporizing unit automatically shuts off when the water is entirely evaporated. Screen protects evaporating unit, and the cabinet is plastic. Unit can be supplied with humidstat for controlling humidity automatically, and an automatic water control to keep a supply of water in the evaporating tank at all times, regardless of rate of evaporation. Modern Equipment Co., 38 Myrtle Ave., Bloomfield, N. J.

COMBUSTION TESTING INSTRUMENTS

Line of combustion testing instruments includes portable and stationary transparent CO_2 indicators, draft gages, manometers, and accessories. Portable Model





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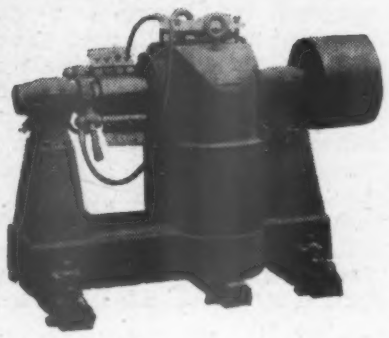

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Fig. 123 "N-M-D" Globe (Non-Metallic Disc)
Fig. 2125 Bronze Gate
Fig. 16 "Renewa" Globe
Fig. 1640 "King Clip" Gate
Fig. 1430 Iron Body Gate

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800 CO_2 indicator consists of a solid block of strong, clear plastic which remains permanently unaffected by the red indicating solution. No glass is used, all metal parts are stainless steel, and the instrument is said to be virtually unbreakable. Portable Model 100 draft gage, also of transparent plastic, measures air velocities, drafts, and slight pressure changes. Scale graduations extend 5 inches, with more than an inch of sliding adjustment. Draft indication is continuous. F. W. Dwyer Mfg. Co., 317 South Western Ave., Chicago 12.

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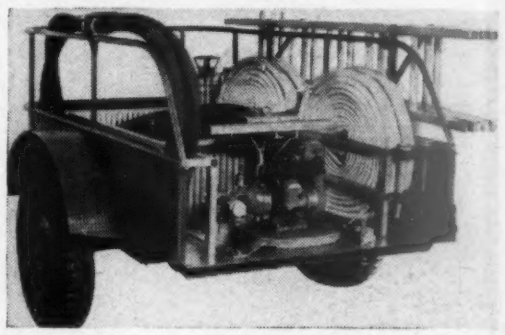
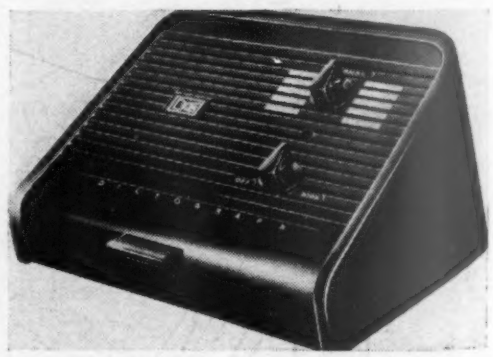
High-pressure pumping and firefighting unit is compactly mounted on a two-wheeled trailer. Equipment consists of a gasoline-driven high-pressure utility pump, 75-ft. supply hose and 250-ft. fire



hose, 18-ft. 3-section extension ladder, fire axe, and hand extinguisher. The trailer is a 48x78 inch steel box body mounted on heavy-duty automobile tires, and can be attached to automobile or truck. It is fitted with a handrail on three sides and hinge-mounted tailgate. The independently powered pump delivers about 40 g.p.m. of water at 120-lb. pressure. A 4-cycle, 5-hp. gasoline engine is mounted integrally with the pump. Any water source may serve the unit. Pump is demountable, and may be used at any distance from the trailer. Porto-Pump, Inc., 227 Iron St., Detroit 7.

INTERCOMMUNICATION UNIT

Electronic Intercom provides instant selective voice-to-voice contact between any desired points in the plant. The in-



tercommunication system consists of a master station which has a 10-call capacity including other masters, and can be enlarged as needed. Annunciator showing incoming calls, as well as a two-call paging switch, is optional. Dictograph Products, Inc., 580 Fifth Ave., New York 19.

CENTRIFUGAL PUMPS

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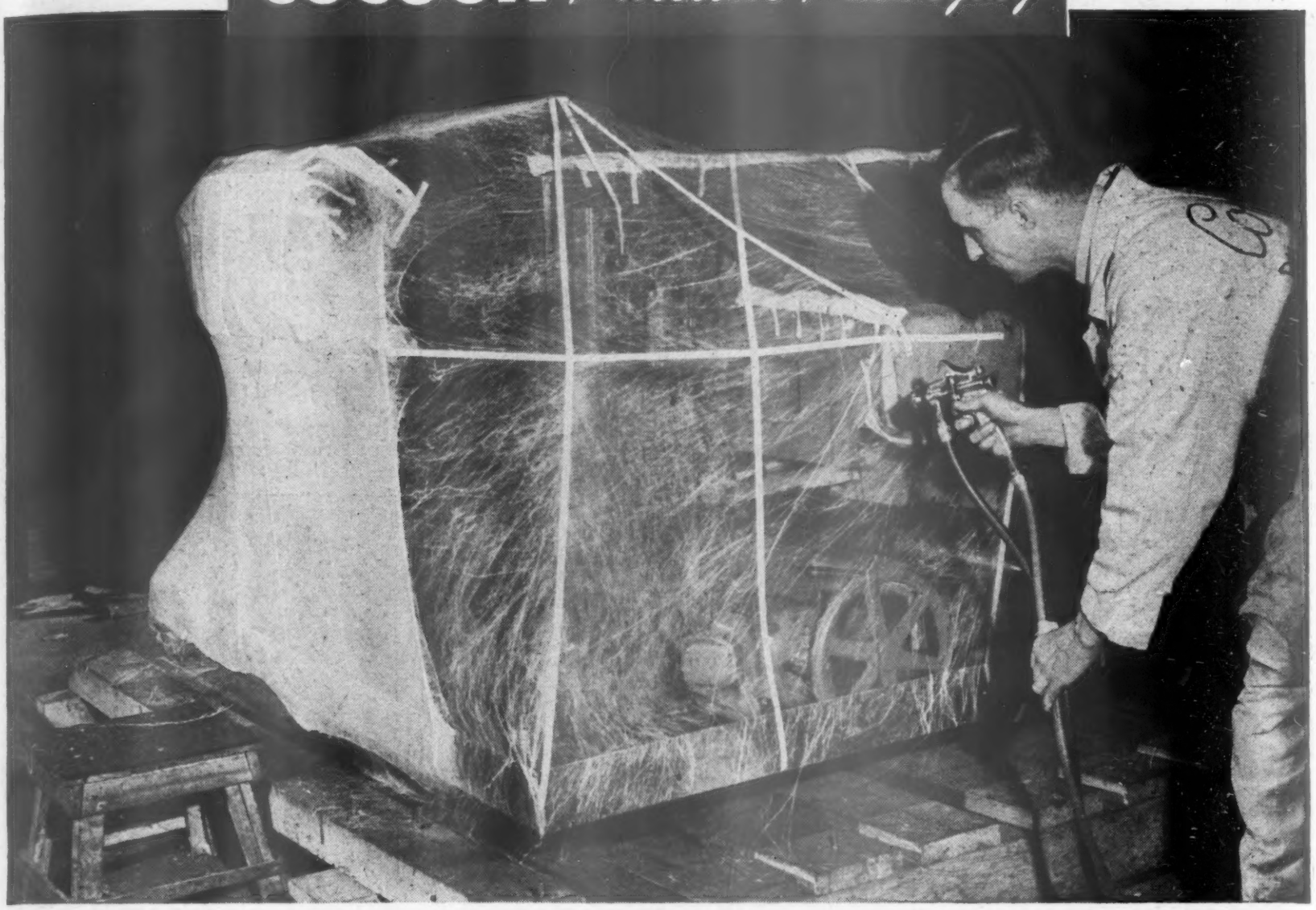

Now, you can eliminate costs like these from your budget: the cost of disassembling machinery and equipment in preparation for packaging . . . the cost of applying greasy preservative coatings . . . the cost of replacing, or re-conditioning, shipments damaged by moisture . . . the cost of removing preservatives and reassembling equipment at destination. These items represent real money!

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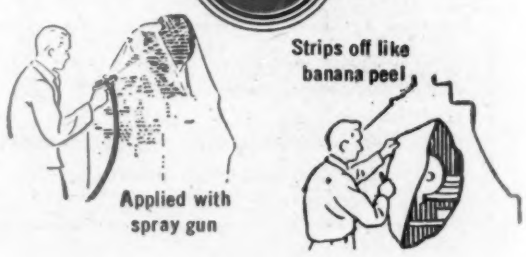
The number and scope of inquiries about COCOON is amazing. To help us answer *your* inquiry quickly—to make it possible to give you a comprehensive recommendation—please give us as many details as possible, including: the item to be packaged; range of sizes; extent of protection required, and for how long; whether your problem involves storage, domestic or export shipment. Descriptive literature or photographs of your product are very helpful.

Whiz



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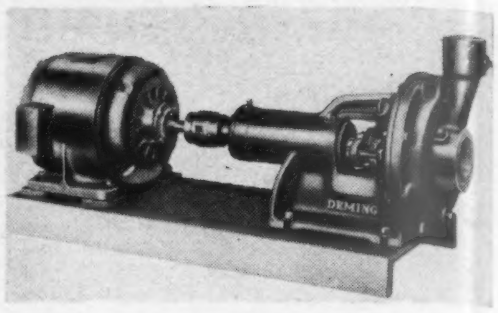
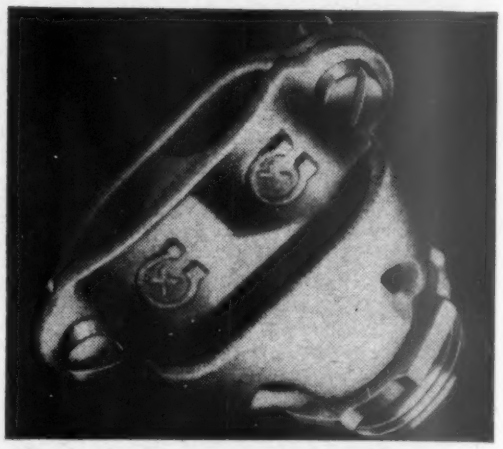


impeller, two-ball bearing with open impeller, and two-ball bearing with semi-enclosed impeller. Each is made for belt drive, and for direct connection to electric motor. The line includes ½-, ¾-, 1-, 1½-, and 2-in. side suction sizes. Capacities range from 2 to 200 g.p.m. The pumps are suitable for circulating and booster service, for pumping liquids heavier than water, including viscous liquids. The Deming Co., Salem, Ohio.

CABLE CONNECTOR

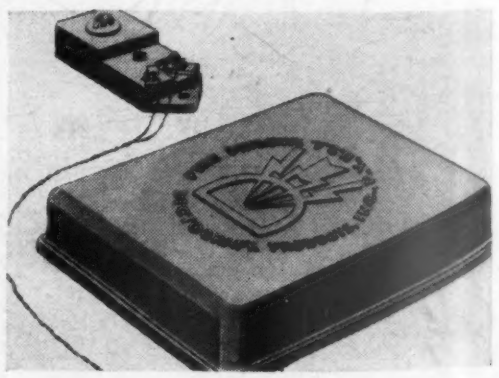
Duplex connector (Catalog No. DC-15), for PVX armored and non-metallic cables, takes full range of cable sizes



from 2-conductor No. 14 to 3-conductor No. 10. Accommodates two runs of the small cables in a ½-in. knockout. Two-screw clamp provides an equalized squeeze action on both cables. Gedney Electric Co., RKO Bldg., Radio City, New York 20.

FIRE ALARM SYSTEM

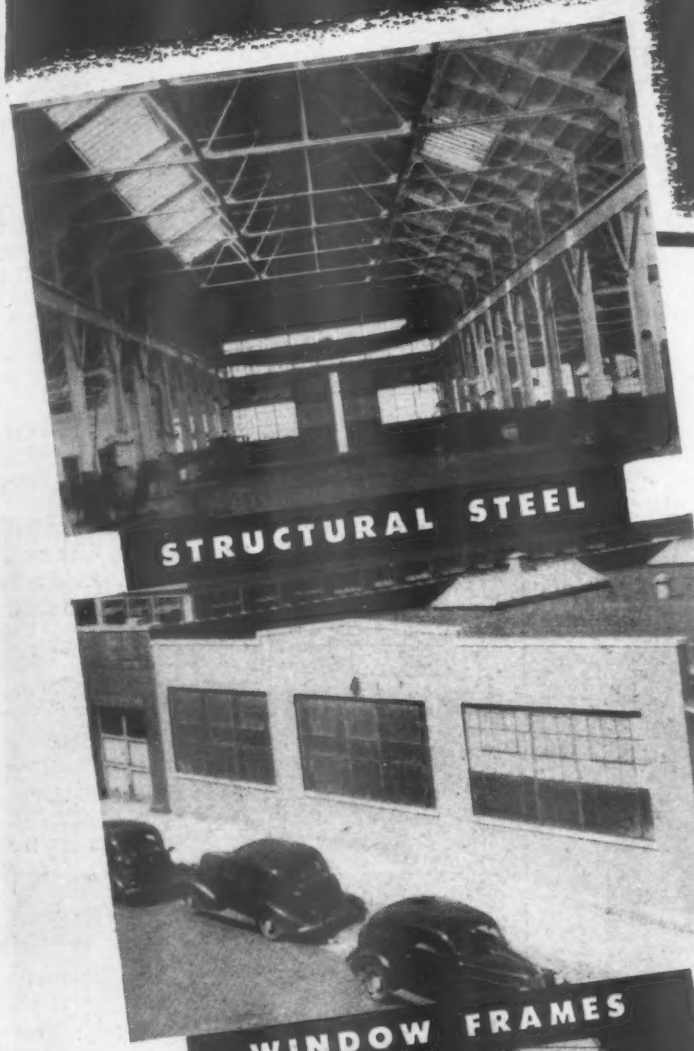
Self-powered fire alarm system, called Fire Detective, requires no connection to any outside source of electric current, and can be used anywhere. Consists of the master control to which two thermal detection units are wired. A bell in the master control unit rings continuously whenever the temperature at a thermal unit reaches 140 deg. F. The thermal units may be individually tested by pressing small red button on each, actuating the alarm bell in the master unit, if the system is in working order. Additional thermal units may be con-



RUST-OLEUM

THE MODERN RUST PREVENTIVE

Cuts Maintenance Costs 3 Ways



ITS PROTECTION LASTS LONGER!

1

As a protective coating, Rust-Oleum lasts two to ten times longer on most jobs. This means much longer intervals between applications—at a proportionate saving in labor.

LESS PREPARATION IS REQUIRED

2

No sandblasting or chemical cleaners are necessary. Wirebrushing removes scale, blisters, dirt, etc. Rust-Oleum penetrates every pore of the metal and merges the remaining rust into the protective film.

RUST-OLEUM GOES ON FASTER

3

It saves 25% of the time ordinarily required for application and covers 30% more area than ordinary materials—an important saving. Rust-Oleum dries in from four to eight hours, according to job conditions.

Use by industry—*under the worst possible weather and industrial conditions*—proves conclusively that Rust-Oleum STOPS AND PREVENTS RUST. It provides a tough, pliable, waterproof coating that seals surfaces against destruction. Moisture, fumes, heat, smoke and similar damaging elements, alone or in combination, cannot penetrate Rust-Oleum to attack metal.

Nothing is comparable to RUST-OLEUM as a positive money-saving rust preventive. *For years it has been saving money for American industry.* For greater maintenance economy—investigate Rust-Oleum NOW. *Ask your distributor or write today for Catalog of recommended applications.*

EASY TO USE
LASTING PROTECTION

APPLY BY BRUSH,
DIP OR SPRAY

RUST-OLEUM CORPORATION

2437 Oakton Street • Evanston, Illinois

BOOST PRODUCTION

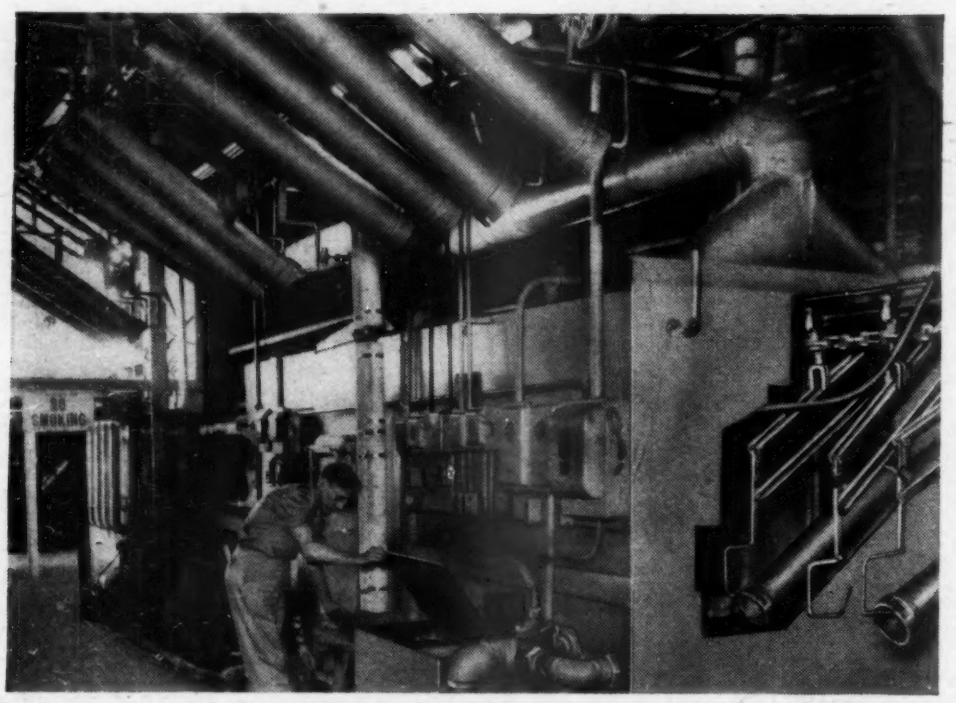
LOWER YOUR COSTS

with an A-F Completely Coordinated

Conveying and Cleaning Installation

HERE IS THE start and finish of an Alvey-Ferguson *Engineered* Completely Coordinated System for conveying and cleaning metal containers, economically and efficiently.

An A-F Overhead Trolley Conveyor carries the containers through the A-F Cleaning Machine, shown below, where the operations of washing, phosphate coating, first water rinsing, chromic acid rinsing, second water rinsing and drying are performed. The containers then are carried overhead by the conveyors through paint dipping, the infra-red dryer and back to store room packing and shipping for a complete circuit.



★WRITE TODAY, without obligation on your part, for folders. State whether you wish to see how others have solved their materials-handling and products-handling problems—or their metal products cleaning problems or both!

THE ALVEY-FERGUSON COMPANY

Established 1901

135 DISNEY STREET CINCINNATI 9, OHIO

Offices in Principal Cities

CONVEYING EQUIPMENT

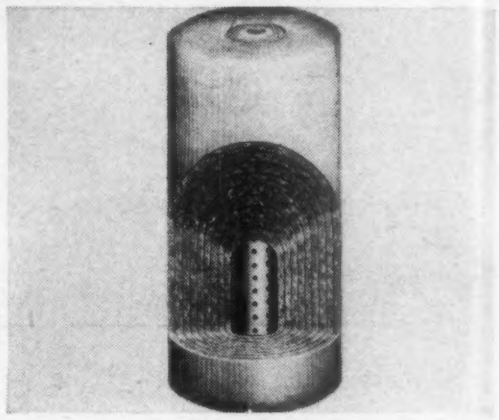
Alvey-Ferguson

METAL PRODUCTS CLEANING EQUIPMENT

nected to the master control station. Dictograph Products, Inc., 580 Fifth Ave., New York 19.

OIL FILTER ELEMENTS

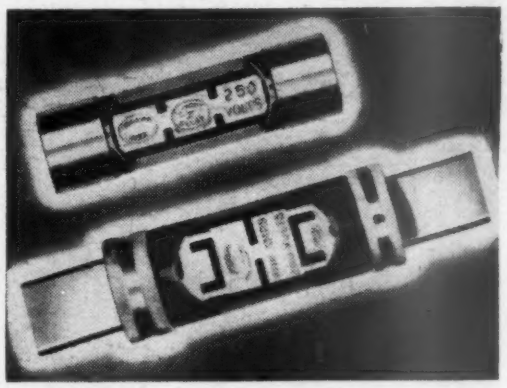
Suitable for all types of lubricating systems, oil filter elements consist of lint-free textiles wrapped in a closely knit



muslin, pressure wound in convolutions around a perforated metal core, and covered with a heavy tubing or muslin jacket. The horizontal flow of oil from outside to inside through the laminated construction is said to increase dirt and sludge removal. The filter elements are made in 260 different sizes. Engine Life Products Corp., El Monte, Calif.

RENEWABLE FUSES

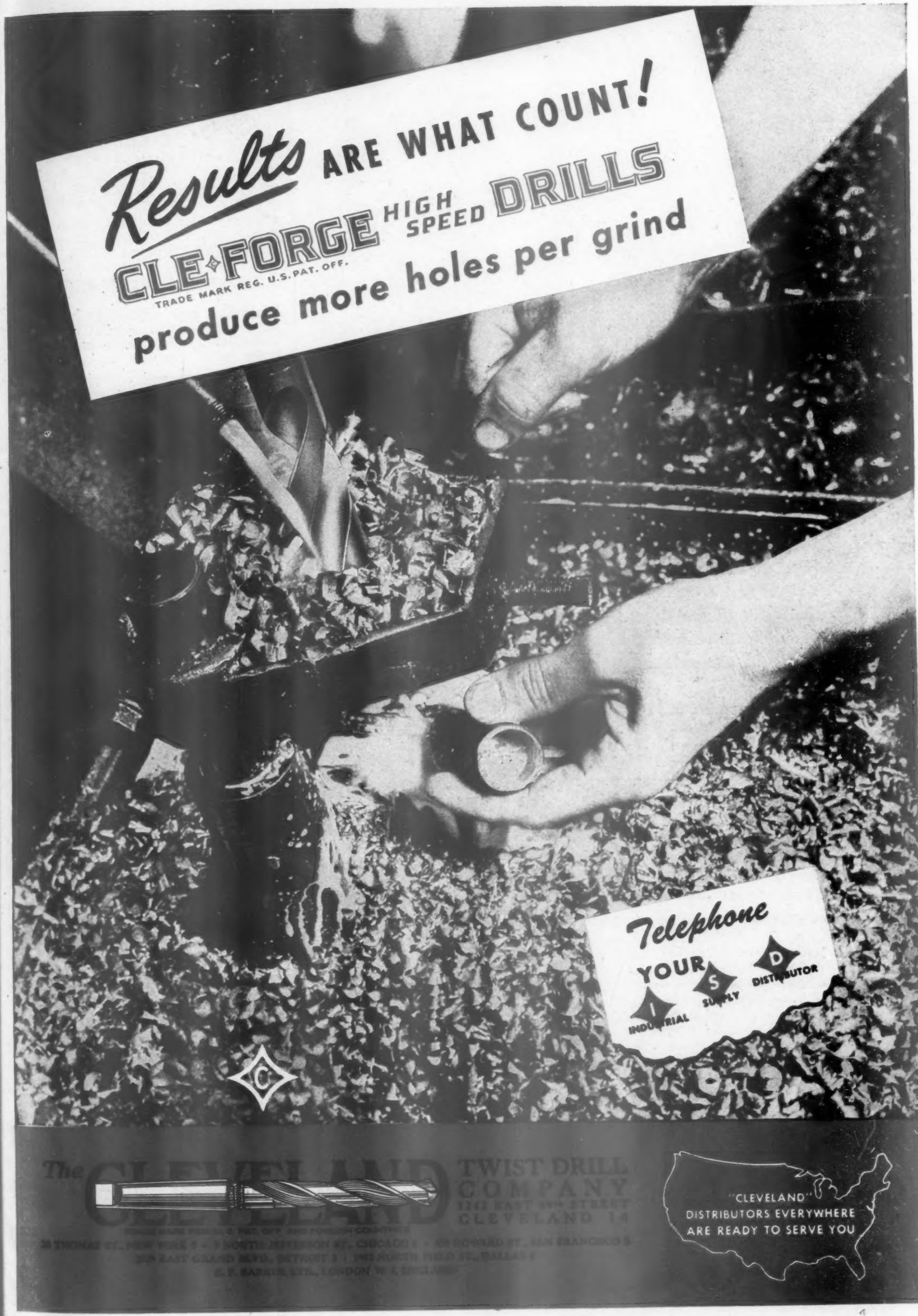
Renewable "time-delay" cartridge fuses are claimed to provide overload protection in the 135 and 200 per cent range. The interchangeable fuses can be



quickly disassembled to insert new links. The knife-blade type is designed to maintain alignment of the blades under all conditions. The ferrule type fuse is built for accessibility. Both models are made for 250 and 600 volts, and 1 to 600 amperes. Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago.

MULTI-POLE SEQUENCE RELAY

Reversing, separate-circuit ratchet-operated multi-pole sequence relay, Type 96AFA, is adaptable to applications involving the addition and subtraction of loads, as in switching in or switching out individual units from a bank of capacitors. It is a two-coil relay. One operating coil steps the cam shaft forward, a step at a time, and the second coil steps the shaft in the reverse direction. Mechanical stops limit the forward and reverse travel of the shaft. Standard ratchets supplied have 12 teeth, and a total of 12 contacts may be obtained in a sequence, with no more than 6 separate contacts between the pairs of bearing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TRADE MARK REG. U.S. PAT. OFF.
produce more holes per grind
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The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
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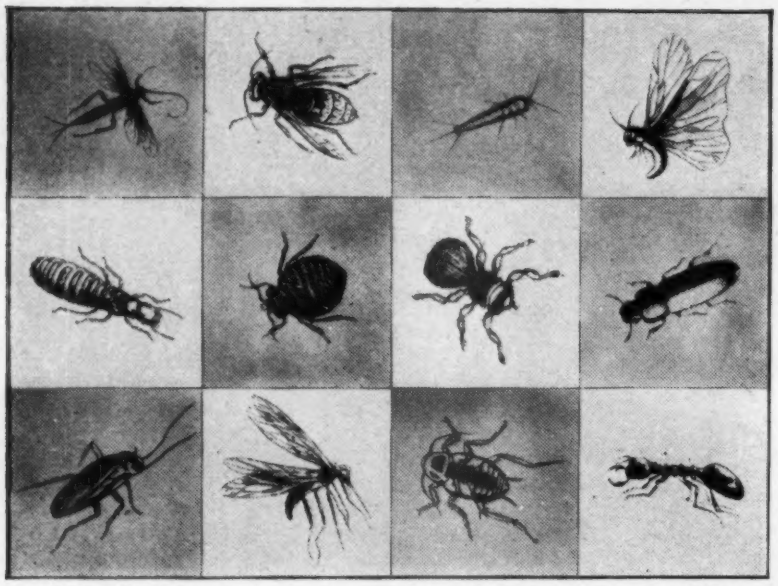
"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

PICK the PESTS

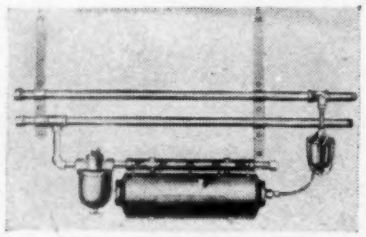


...you'd like to give the "AIR" Forever!

Do your special insect pests crawl or fly? Thrive on Food or Fabric? Run rampant in a midget-sized cubicle or nest in the hard-to-reach places of a tremendous factory? Get rid of them with the West Atomizer —an effective scientific method of insect control. Designed to eliminate all pests *wholesale* with a fast "positive-kill."

A permanent installation which shortly pays for itself in time and labor saved (plus the tremendous advantage of complete coverage) the West Atomizer is perfected for efficient and effective use with compressed air. Just turn on the air valve and it *shoots out* a deadly fog of insecticide which reaches into the tiniest cracks and crevices. *Does its lethal magic as quickly in a mile-long plant as in a small store room.* Dispenses a "dry" mist so it won't wet floors, walls, or product if used as directed.

With the West Atomizer, use Vaposector Fluid—one of West's complete line of effective insecticides, specially prepared to help lick your insect problem. Vaposector is a concentrated, odorless insecticide—and is safe to use. Why not consult one of over 475 trained West representatives at once?



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LONG ISLAND CITY 1, N. Y.

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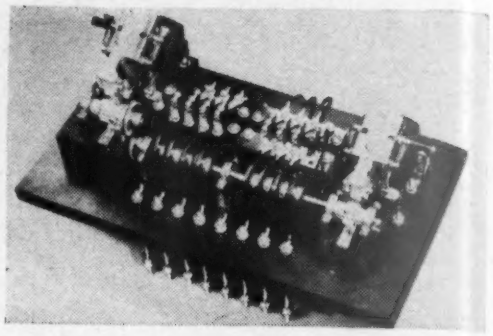
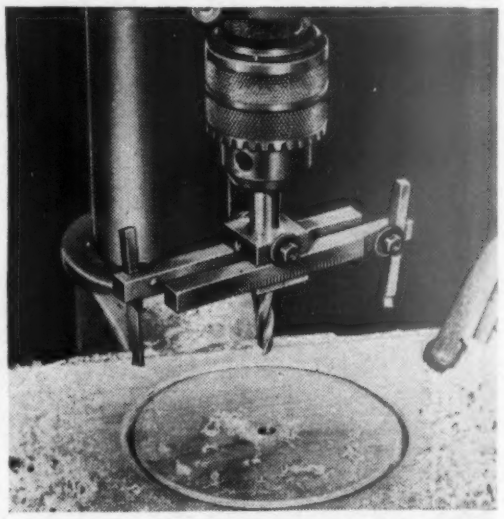
PAPER TOWELS • AUTOMATIC DEODORIZING APPLIANCES • LIQUID SOAPS



supports. Operating coils are for a.c. use only. Struthers-Dunn, Inc., 146-150 North 13th St., Philadelphia 7.

ADJUSTABLE HOLE CUTTER

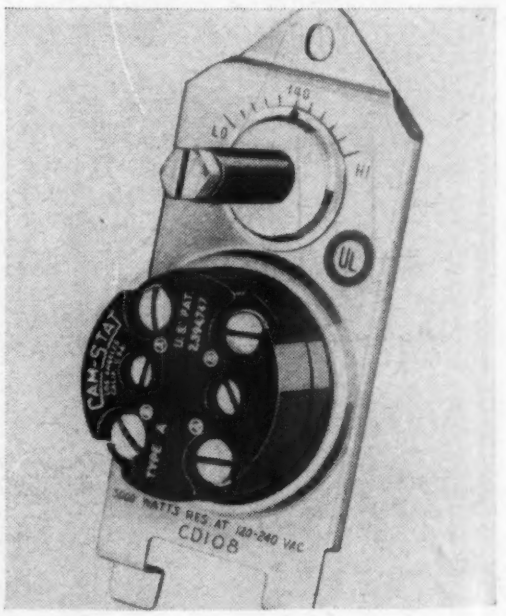
Two-wing type adjustable hole cutter, for wood, plastic, plywood composition board, and light metals, has a square body with channels to accommodate

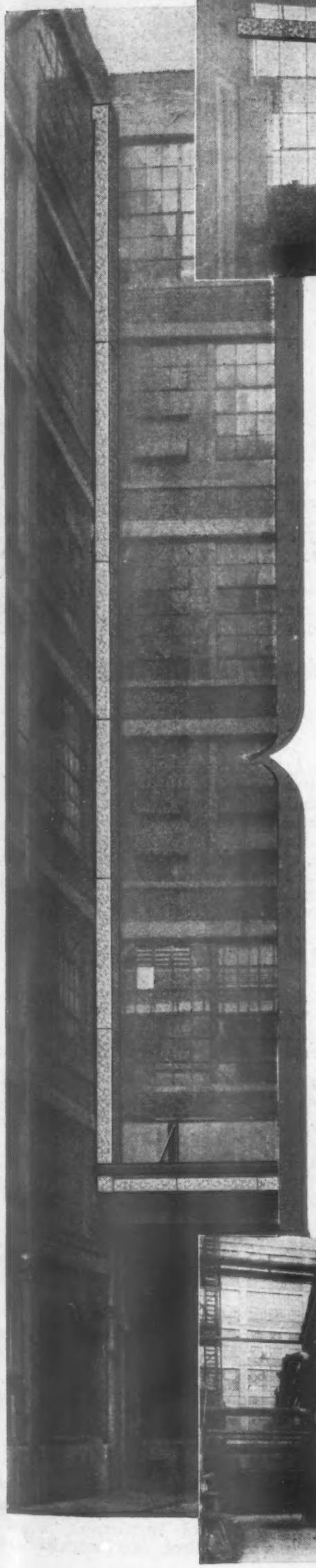


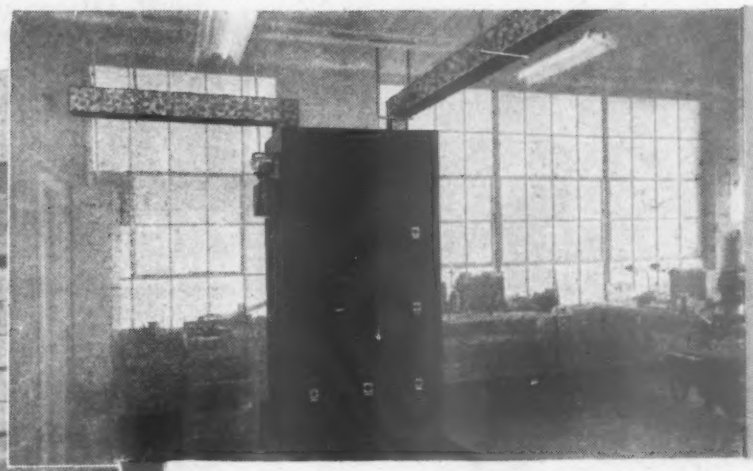
cross-arms. Slots in cross-arms hold the tool-steel blades in cutting position, secured by hexagon flanged bolts. The head will accommodate either a pilot or center drill. Both cross-arms have scale markings at $\frac{1}{16}$-in. intervals, for cutting circles or holes from 2 to 8 inches in diameter in materials up to 1 inch thick. Suitable for standard power-driven drill press, and fits standard $\frac{3}{8}$- or $\frac{1}{2}$-in. chuck. Circo Tool Co., 617 North 2nd St., Milwaukee 2.

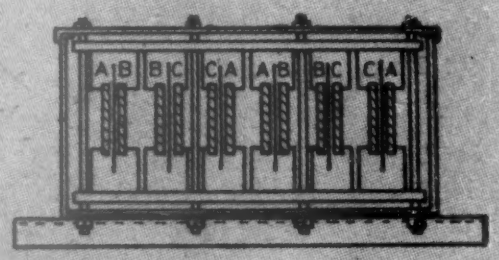
WATER HEATER CONTROL

Rating of Type CD108 automatic electric water heater control is 3000 watts at 120-240 volts, a.c. Both primary, or lower, and secondary, or upper, thermostats have a temperature range of 60 to 190









HIGH EFFICIENCY
FEEDER (FA) BUSDUCT

High Efficiency

VENTILATED TYPE
FEEDER (FA) BUSDUCT

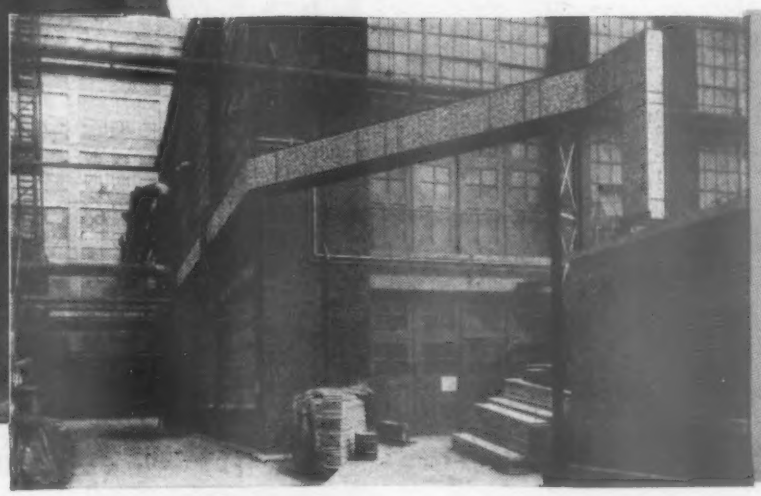
...actual tests show less than 2 volts drop per 100 feet at 80% power factor.

Maximum efficiency is the fundamental engineering principle of the improved High Efficiency, Ventilated Type Feeder (FA) Busduct.

Designed and built to meet today's requirements for maximum plant efficiency and productivity, Feeder (FA) Busduct is unexcelled for the transfer of heavy current from service entrance to distribution center, from generators to switchboards or from switchboards to distribution centers. Of even greater importance is the fact that voltage loss is reduced to less than 2 volts per 100 feet at 80% power factor.

High Efficiency Feeder (FA) Busduct is made in standard 10-foot lengths for indoor and outdoor installations. It is available in capacities from 600 to 4000 amperes, 575 volts and less.

See your nearest (FA) District Representative for details, or write for our catalog.



FA TRADE MARK

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PANELBOARDS SAFETY SWITCHES
SWITCHBOARDS LOAD CENTERS
ELECTRIC QUIKHETER

Frank Adam
ELECTRIC COMPANY
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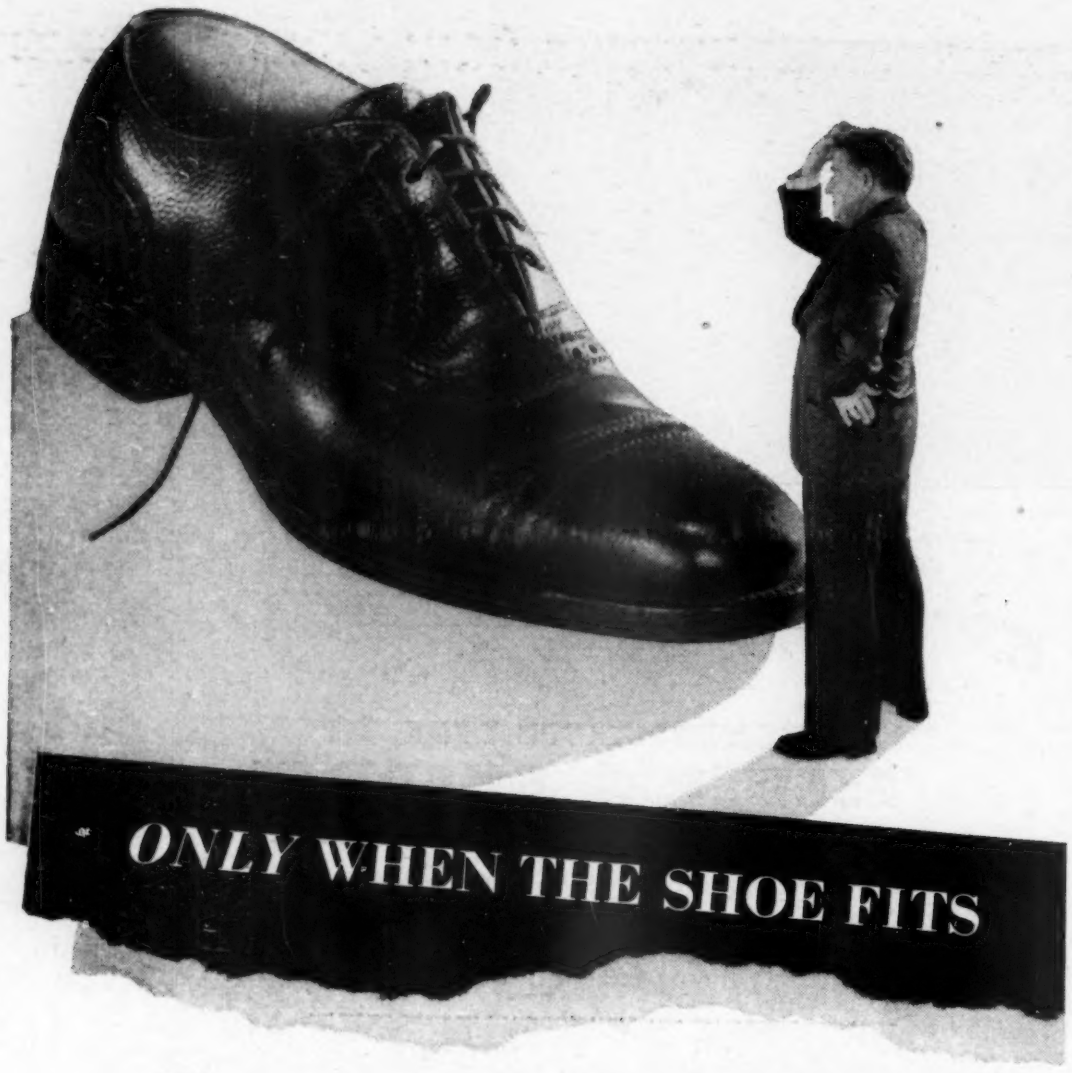

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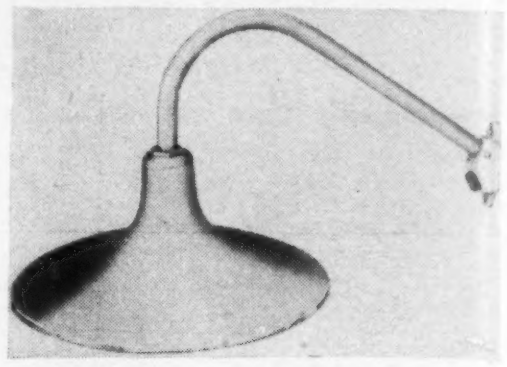
deg. F. Differentials are 10 deg. F. for the primary thermostat, and 25 deg. F. for the secondary thermostat. Lower differentials are available. A single screw holds mounting bracket in place. Cam-Stat, Inc., 2037 South La Cienega Blvd., Los Angeles.

YARD LIGHT

Suitable for permanent all-weather use, yard light of one-piece construction consists of a heavy aluminum 14-in. reflec-



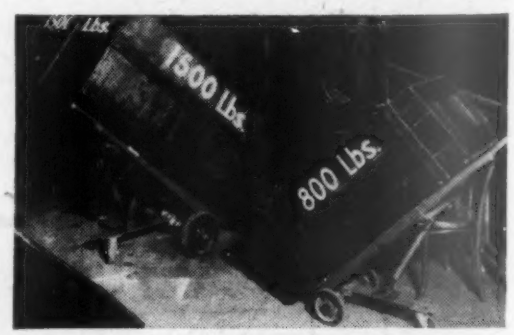
tor and a 21-in. neck of ½-in. rigid pipe. Gives wide outdoor light distribution with a 150-watt lamp. It is furnished with socket, No. 14 wire, and cast aluminum wall flange, including 2-hole insulating bushing, and 2-in. lag screws. Space is allowed under the flange for splicing. Steber Manufacturing Co., 2700 Roosevelt Rd., Broadview, Ill.

PROTECTIVE COATING

"Barriercoat" is a moisture-proof, vapor-proof, corrosion-resisting coating for wood, metal, concrete, and other surfaces, maker states. Other features claimed are that it does not sag, craze, disintegrate, chip, or peel, and offers permanent protection. It requires no heating, and can be applied by brushing, spraying, or troweling. Supplied in black, it also may be obtained in maroon, green or aluminum. Carbozite Protective Coatings, Inc., Greensburg, Pa.

TILT TRUCK ATTACHMENT

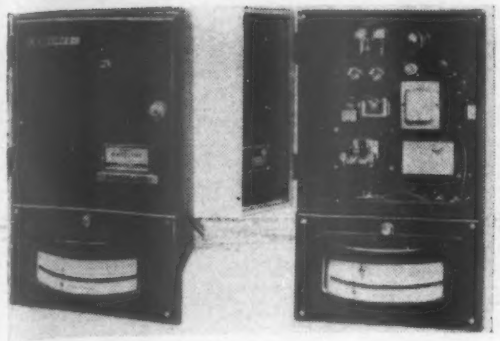
Increasing safety in hand-trucking heavy loads, universal tilt truck attachment takes the load strain off the operator, and doubles the carrying



capacity of any two-wheeled hand truck, maker states. Free steering, the attachment provides a third wheel for the load, and can be adjusted to any desired load balance. Made in two sizes. Melooz Mfg. Co., 1311 West Washington Blvd., Los Angeles 7.

TEMPERATURE CONTROL

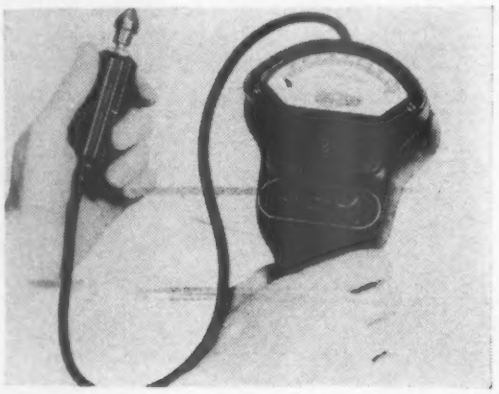
Features claimed for temperature-variation control instrument, named Xactline Capacitrol, are "anticipating"



factor which holds temperature tolerances as close as ⅕ deg. F. and power "on-off" cycles as short as 3 seconds, positive electrical action, and simple adjustment for wide range control requirements. Has no gears, cams, motors, bearings, or other mechanical parts. Includes electronic control principle, instant control action, direct-reading indicating scale, separately enclosed measuring instrument, and interchangeable unit construction. Available in two models, in flush or surface mounting case. Claud S. Gordon Co., 3000 South Wallace St., Chicago 16.

SPEED METERS

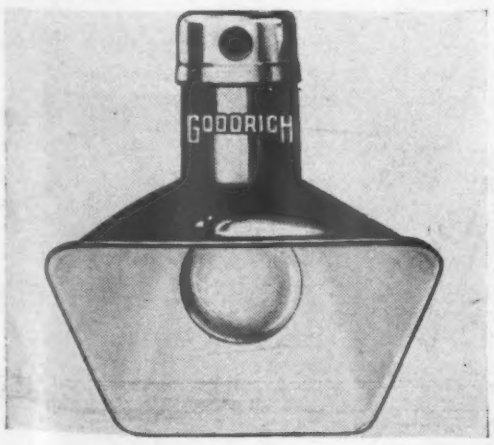
Hand Type 25D liner meters measure speed of products running through processing mills and presses. Usually supplied as single range instruments, the direct-reading meters are available in ranges from 3 to 3000 y.p.m., or 10 to



10,000 f.p.m. Contact is made with a replaceable free-running disk, which is clamped on the rotating shaft of the head. The contact surface of the disk is oil-resistant synthetic rubber. Lubrication of the head is permanent, and the instrument is rugged electric type, with no flexible shafts, centrifugal mechanism, or other components to wear out. Metron Instrument Co., 432 Lincoln St., Denver.

SIGN ILLUMINATOR

Square or rectangular signs may be illuminated by sign reflector which can be adjusted to distribute the light uni-



San Diego

A Big Market (550,000) Near 4,000,000 Others

Statement by Mr. E. H. Hubbell
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"When Mrs. Hubbell's Bakeries, wholesale cookie and cracker bakers in the East for 11 years, decided to open a Western plant, San Diego won hands down. First was the market . . . 550,000 in the county . . . 4,500,000 within 200 miles. Second, we found a surplus war plant that filled our exact needs. And third, Mrs. Hubbell and I will enjoy the perfect year 'round climate the rest of our lives."

SAN DIEGO OFFERS...

2,000,000 square feet of Gov't Surplus Plants for sale or lease.

Adequate shipping facilities . . . water, rail, highway and air.

Labor pool of efficient and productive workers.

Nation's 21st richest agricultural county.

125 miles from nation's third largest market.

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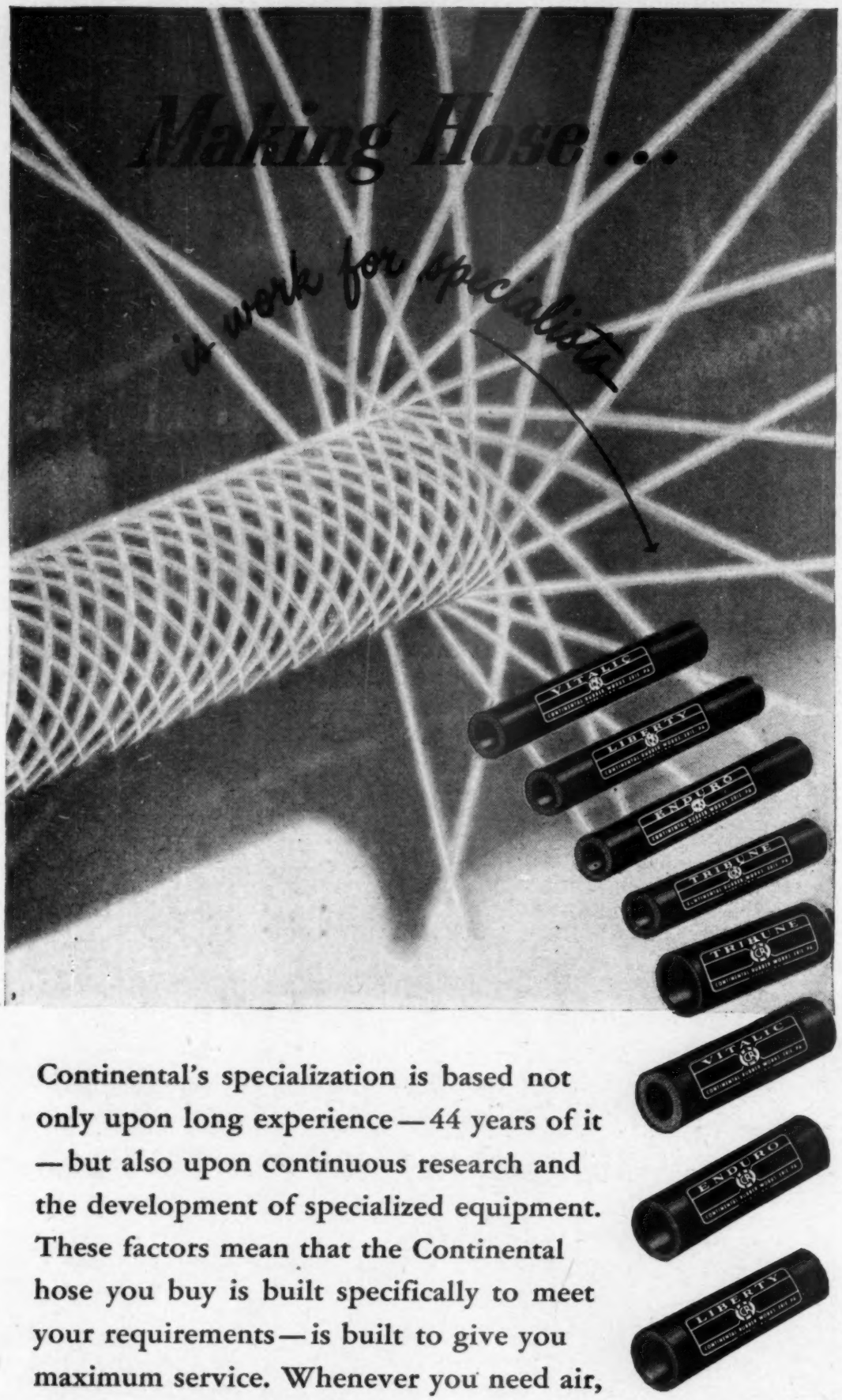

Continental's specialization is based not only upon long experience—44 years of it—but also upon continuous research and the development of specialized equipment. These factors mean that the Continental hose you buy is built specifically to meet your requirements—is built to give you maximum service. Whenever you need air, welding, water, steam, or suction hose, why not consult Continental?

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St. Louis, Mo.
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Syracuse, N. Y.

CONTINENTAL RUBBER WORKS • ERIE, PENNA., U.S.A.

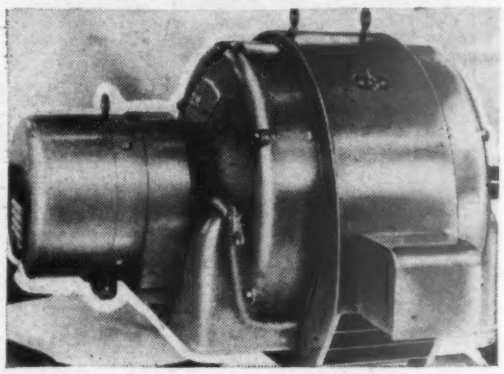
formly over the entire surface. Right-angle hood can be mounted on a straight piece of conduit, and the reflector may be attached or detached, without screws. It is equipped with resilient socket which cushions the lamp against vibration. Reflector is finished in permanent, weatherproof porcelain enamel, and is made in three sizes, accommodating lamps of from 60 to 150 watts. Goodrich Electric Co., 4600 Belle Plaine Ave., Chicago 41.

OVERFLOW VALVE

Throttling type unloading valve, class UL, for use with steam, air, or gas, is constructed to maintain a constant inlet pressure by relieving the excess to a lower pressure system. Smooth throttling control during the entire cycle of operation combined with quick action under sudden pressure variations are claimed. Features high-pressure bronze body, renewable wearing parts, hard-surfaced seat ring, hardened stainless steel main and controlling valves, bronze piston, corrosion-resistant piston rings, and phosphur bronze diaphragm. Available in sizes from ½ to 4 inches, for inlet pressures from 25 to 300 p.s.i., inlet temperature to 550 deg. F., and pressure difference not less than 15 p.s.i. Leslie Co., 112 Delafield Ave., Lyndhurst, N. J.

SYNCHRONOUS MOTORS

Heavy-duty synchronous motors, for constant-speed drives up to 1000 horsepower, are built with splash-proof housings. Stator frame is said to be steel-strong without excessive weight. Brush



inspection and blowing out is simplified with removable access plates, and sealed bearings can be cleaned and refilled without motor disassembly. Double-end ventilation is provided by a blower on each end of motor. Exciter also is fitted with blower. Available in unity or leading power factor, with torque and kva. requirements to suit the job. Electric Machinery Mfg. Co., Minneapolis 13.

VARIABLE SPEED DRIVE

Improved model of variable speed drive, called Variable-V-Planetary Speed Selector, designed as an independently mounted transmission, provides any speed from zero to 800 r.p.m. at constant torque, from a constant speed power source. Available in ½-, 1-, and 2-hp. output, it employs planetary motion with four variable pitch sheaves and two standard cross section V-belts. Belt speeds permit rapid changes in output speed by lever-acting self-locking control handle. Optional V-belt or flexible coupling input and output permit mounting in any position. The B. F. Goodrich Co., Akron.

Shipping Costs Cut by Wire Fastening

Since a unit saving in time or costs is just as valuable when made in the shipping department as when made in the manufacturing process, forward-looking firms thoroughly investigate cost-cutting possibilities in shipping.

A company in Detroit, for example, had been hand gluing corrugated shipping containers. A job analysis showed a production of 55 cartons per hour for two men. Considerable floor space was required for drying purposes. Stapling with Bostitch Autoclench machines resulted in a 40% saving in costs and a production boost from 55 cartons per hour to 100. In addition, stapling brought about cleaner working conditions, more space, and a measurable speed-up in shipments.

A food company shipped its products in crates which came to the growers "knocked down." The ends and heads had to be nailed together to set the crate up for shipment. Replacing hammer and nails with a Bostitch hand stapler cut the time necessary to assemble the crates to one-third that formerly required.

Costly delays in transit and confusion on the part of customers caused a Baltimore company to look for a better method of attaching bills of lading to shipping containers. The old way was to glue a kraft envelope containing the bills to the outside of the corrugated box. The envelope was frequently torn off and lost. In addition, the glue smeared the carton, spoiling its intended merchandising effect. Bostitch staples fastened the envelope securely and restored the merchandising value of the box.

A furniture manufacturer in Kansas City saved himself considerable shipping time in an emergency by employing a little ingenuity. Faced with a shortage of proper-sized boxes for a shipment of tables, he spliced pairs of smaller boxes together with Bostitch staples and completed the shipment on time.

Examples like these are common. Every day dozens of firms discover that Bostitching is cleaner, quicker, simpler and cheaper than old-fashioned fastening methods. For maximum efficiency, care must be used in selecting the right machine and the right staple for the job. Bostitch, with over 800 models of wire fastening machines and the world's largest staff of field representatives, offers the manufacturer unique help in cutting his shipping costs. —*Adv.*

"Savings So Great" . . . Method Now Standardized in Five Plants

Difficult job made easy

Bostitching, in one operation alone, saved a famous boat builder 57% in time . . . made similar savings in four other operations. Result: Bostitching now standarized in all five of his plants.

Others save, too: A big commissary company saved 20-25% time Bostitching sandwich wrappers . . . gained 30% sales increase from package's improved appearance. A paintbrush maker doubled production.

No matter what materials you fasten: plastics, cloth, wood, paper, leather, or even metal . . . one of the 800 Bostitch machines may do it better and faster with wire. Skilled research engineers and 250 field men in 91 key cities offer you the benefits of 50 years' Bostitch experience to help solve your fastening problems.

Get more data: Broadside B-188 contains helpful information on representative models of the world's most complete line of stitchers, staplers, tackers, hammers. The coupon below also lists other fact-full Bostitch literature. Check it and mail today.

BOSTITCH
fastens it better, AND FASTER with wire
ALL TYPES OF STAPLES APPLIED BY MACHINES
ALL TYPES OF MACHINES FOR APPLYING STAPLES

Bostitch, 446 Mechanic Street, Westerly, R. I.
(Bostitch-Canada, Ltd., Montreal).

Please send literature checked:

☐ B-132, Shipping Room tools and applications ☐ B-157, Bostitching—the modern carding method
☐ B-175, Bostitching for Bag Sealing ☐ B-188, Showing representative Bostitch time-saving tools

Name .....

Company .....

Address .....

HERE'S THE NEW LINE OF Series K

ROPER ROTARY PUMPS

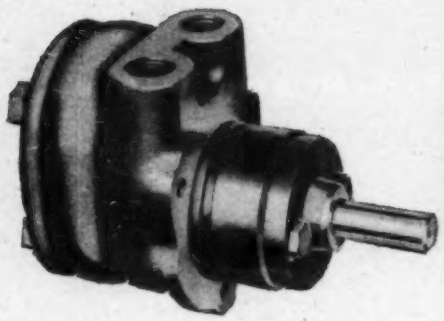


FIG. 17K PUMP HEAD with Mechanical Seal. Sizes ¾, 1½, and 3 g.p.m., as illustrated. Fig. 18K is equipped with built-in relief valve. Packed Box is available.

FIG. 1K with Packed Box. Available in 5 g. p. m. size only. Fig. 2K is equipped with built-in relief valve. Mechanical seal is available.

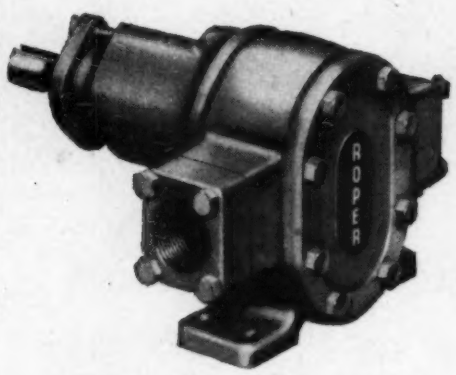


FIG. 1K with Packed Box — supplied in 10, 15, 20 g.p.m. sizes with companion flanges. FIG. 2K equipped with built-in relief valve. Mechanical Seal available on all models.

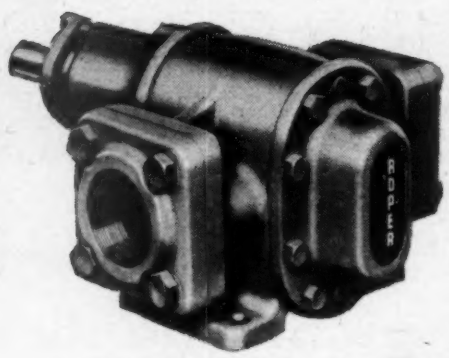


FIG. 1K with Packed Box — supplied in 30, 40, 50 g.p.m. sizes with companion flanges. FIG. 2K equipped with built-in relief valve. Mechanical Seal available on all models.

¾ TO 50 G.P.M. — PRESSURES TO 150 P.S.I.

Adaptable to a wide range of jobs . . . pressure lubrication, hydraulic service, fuel supply, or transfer work pumping clean liquids. These Ropers are self-priming, operate in either direction, handle total suction lifts up to 25 feet. Direct connected, belt, or chain driven. Because of the new Roper venturi suction and discharge principle, energy loss from cavitation, turbulence, and friction is minimized. This proportional means of distributing viscous liquids uniformly across the gear face increases operating efficiency . . . adds quietness and reduces power costs . . . permits gears to handle a wide range of viscous liquids at standard motor speeds.

Get All Of The Facts— Send For Booklet

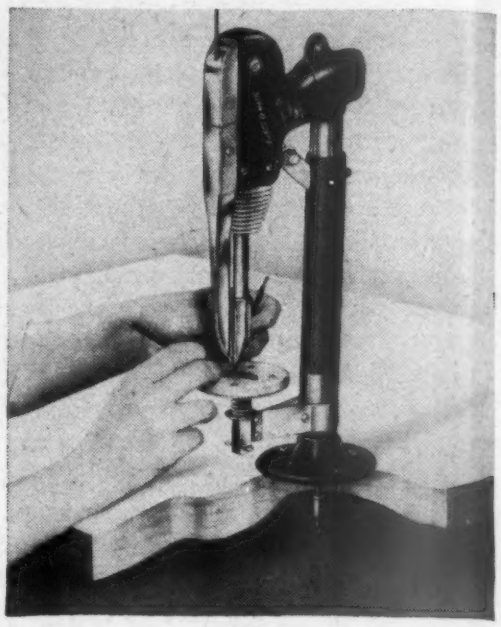
Complete Model "K" details including specifications, exploded view of construction features, wide range of mountings, etc. Also describes other models up to 300 G.P.M., pressures up to 1000 P.S.I.

GEO. D. ROPER CORPORATION
185 Blackhawk Park Ave., Rockford, Ill.

PUMPS ESPECIALLY ENGINEERED TO FIT YOUR REQUIREMENTS

BUILDERS OF PUMPS FOR MANUFACTURING, MARINE, PETROLEUM, AND PROCESS INDUSTRIES

discharges of static electricity. Registers voltage when brought into an area containing a charged object. Instrument is portable. Davis Emergency Equipment Co., Inc., Halleck St., Newark 4, N. J.



TREADLE ACCESSORY for use with automatic-feed soldering iron can be run by foot action alone, leaving hands free to hold work. Multi-Products Tool Co., 123 Sussex Ave., Newark, N. J.

VIS-O-GRAF AND VIS-O-GRAPH SUMMARY guide plant operating men in visualizing flow of material, analyzing handling operations, installing methods and equipment that will reduce costs. The Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24.

DIE SERVICE cleans, regrinds, and reconditions worn threading dies. Service available for one or any number of dies. The Mechanical Arts Co., 4 Orient Way, Rutherford, N. J.

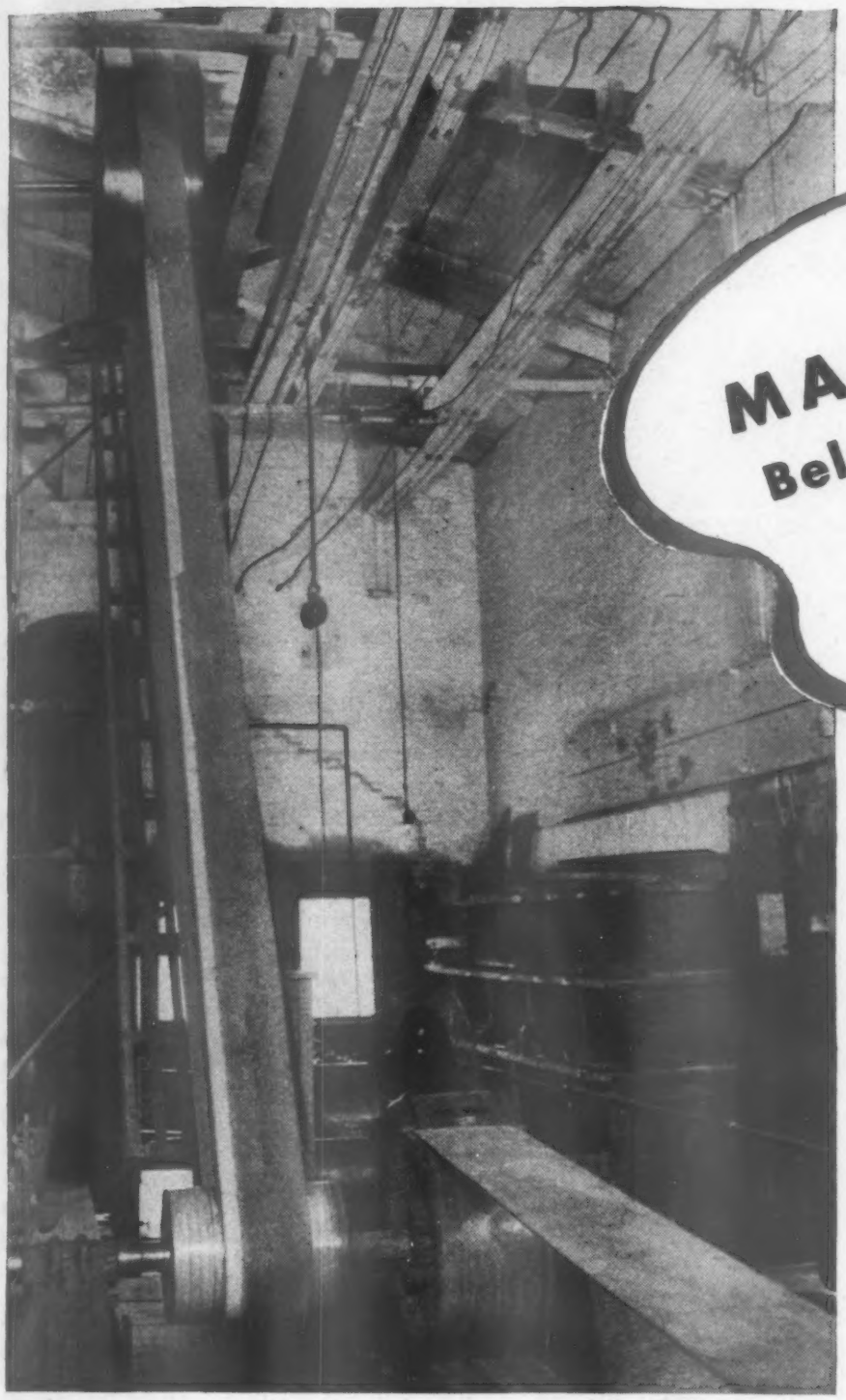
FILMS: *Pay Loads Pay Off,* 16 mm., sound, surveys mechanical handling and stacking of loads; explores areas of unrealized profits in various industries. Automatic Transportation Co., 149 West 87th St., Chicago 20.

Brotherhood of Man, 16 and 35 mm., is based on the pamphlet, "Races of Mankind." Film Alliance of America, 1600 Broadway, New York.

This Is Aluminum. 16 and 35 mm., sound, pictorially answers the question of what aluminum is and where it comes from. Motion Picture Dept., Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19.

SLIDEFILMS: *Lifeline* shows how the need for wire rope in many industries requires careful engineering and manufacturing. Macwhyte Co., Kenosha, Wis.

Your Stake In Collective Bargaining, 35 mm. filmstrip, script, and pamphlet, provides a six-phase presentation on collective bargaining. Public Affairs Committee, Inc., East 22 38th St., New York.



This MANHATTAN Belt . . . gave 22 years continuous service

. . . traveled 1,448,864 miles

The 18-inch, 5-ply Manhattan **Transmission** Belt pictured here was held in storage over 4 years, followed by 22 *years* of actual service. It operated a line shaft in the machine shop of the Huntington and Broad Top Mountain Railroad and Coal Company. This drive is nearly vertical which means that a higher than normal belt tension had to be maintained to prevent slip.

We quote directly from a letter from Mr. F. E. Steele, Superintendent:

> "It is my personal opinion that this is a remarkable service for a belt of this type when we take into consideration the fact that drive pulley was 14 inches in diameter. This within itself would throw considerable strain on a belt of this width and weight, also with a speed of approximately 2,383 feet per minute. During this period of operation we had no trouble whatsoever and at all times the belt worked very satisfactorily."

A lacer accident finally ended its career.

> "Should this accident not have happened, the belt would still be in service and doing a good job."

This is one of many case histories to which Manhattan can point for proof of Workmanship and Quality Materials . . . reasons why Manhattan has long been famous for its belts. Whatever the job, there's a Manhattan Belt that will lower *your* costs, too.

A SINGLE SOURCE for a COMPLETE BELTING LINE

Manhattan offers a range of four driving tension surfaces on rubber transmission belts. Also Endless Cord, Non-Spark, Oil-Proof and Acid-Proof constructions. Belts can be factory-made endless or field vulcanized by the Condor-Weld method. All Manhattan endless belts have the patented Extensible-Tip outer-ply splice which prolongs belt life considerably. Literature on request.

RAYBESTOS R M MANHATTAN

RAYBESTOS-MANHATTAN INC.

Keep Ahead with Manhattan

MANHATTAN RUBBER DIVISION **PASSAIC, NEW JERSEY**

It's as easy as this

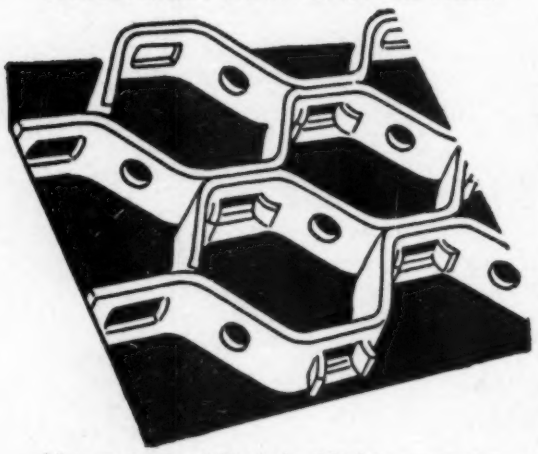
To lock strong Hexteel over entire area, and fill with concrete or mastic for solid, level, *enduring* floor.

Klemp

HEXTEEL

Heavy Duty Surface Armor

Can be quickly and rapidly installed over floor base *old or new*. LOW COST—PRACTICALLY MAINTENANCE FREE!



Heavy steel grid is imbedded in concrete or mastic, and troweled flush with surface. Exposed tops of grid take severest assaults of traffic, trucking, shock of falling material, etc. Gone are potholes, ruts, cracks, depressions! Fits around columns or machines.

SEND FOR COMPLETE KLEMP CATALOG

Also shows Klemp Floorsteel, floor armor that rolls out like a rug; Klemp open steel gratings: steel stair treads; steel safety mats. Write

WM. F. KLEMP CO.
6616 S. Melvina Ave.
Chicago 38, Ill.

SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Lecturer in Government Regulations, New York University, and a Member of the New York Bar

Period Surveyed: March 1 to April 1

TREND INDICATORS

Veterans' Rights

JOB UNDER CONTRACT NOT TEMPORARY

It is the nature of the job that determines whether or not it is a temporary position, and not the terms of the individual employment contract, under which terms of compensation may be fixed from time to time. The fact that veteran was operating under a contract which expired on a certain date, does not render the position a temporary one. About four years prior to his induction, the veteran had entered into a 5-year contract with the employer, whereby he was to serve as publicity manager subject to the general manager and under the control of the board of directors, to be compensated solely on a commission basis. At the time his contract had an unexpired period of one year and three months, the veteran had accepted a commission in the Army and left for active duty. During the time he was in service his tenure had expired and a successor was elected and another man was also elected in his place as vice-president. When the veteran returned from the service, he insisted upon resuming his offices as director of the corporation and vice-president. The veteran's employment with the company was to be continuous for the indefinite future and would be renegotiated and renewed from time to time, as was done in the case of other corporate officers, provided the relationship proved to be mutually satisfactory. (Trust Funds, Inc., v. Dacey—CCA-1)

SEASONAL EMPLOYEE ENTITLED TO REEMPLOYMENT

A veteran, although a seasonal worker who was laid off and working elsewhere at the time of his induction, is still entitled to reemployment rights, where both the employer and the veteran considered him an employee at the time he entered the service. A collective bargaining contract, entered into with the employer during the time the veteran was in service and which establishes seniority rights of employees, cannot affect or destroy his rights. At the time the company laid the veteran off, no seniority system was in effect at his place of business, and employment was given on the basis of the employer's industry plus a system of fair play. The reason the company did not call the employee back before his entering the service was that it knew of his imminent induction. Since the veteran left a position enjoying no legal or enforceable status, and returned to find that a union contract had been set up during the time he was in the service, he is entitled to such seniority rating as he would have enjoyed had he remained in the service of the employer during all the time he was serving in the military forces of the government. (Orville J. Unruh v. North American Creameries, Inc., and Teamsters' Union Local 116—USDC N. D.)

CHANGE IN EMPLOYER'S CIRCUMSTANCES

Where prior to induction two veterans were employed in identical positions, and a change in circumstances leaves only one position available, the employer satisfies his requirements under the Selective Service and Training Act by reinstating in the remaining position the veteran possessing greater seniority under the union contract and offering to the other veteran a position of like seniority, status, and pay. The employer fulfills his obligations even though the veteran with lower seniority refuses to accept such a similar position. (Salerno v. Phelps Dodge Corp.—USDC N. J.)

CHANGE OF CIRCUMSTANCES

A change of circumstances is said to exist when higher qualification standards have developed for professional league baseball players during the time veteran players were in service. If, in the judgment of the employer, veteran employees do not meet the higher standards, the employer is not required to reemploy them. (Barisoff v. Hollywood Baseball Association—USDC S. Calif.)

ENLISTED VETERAN ENTITLED TO REEMPLOYMENT RIGHTS

Reemployment rights are granted to any person who resigned his job as a means of terminating his deferment and thereby availing himself for voluntary induction. The reemployment provisions of the Selective Service Act apply to the man who voluntarily quits his job to enlist or to make himself available for induction as well as to one who is compelled to quit his job because of his induction in the usual course. The Act was not intended to prevent volunteering for induction; nor does it prohibit a man from stepping out of a deferred classification by leaving his employment. (Boston & Maine Railroad v. Hayes, CCA-1)

ELIGIBILITY FOR VACATION PAY

A veteran who returned to work with the expectation of remaining there only

For Dry Scrubbing At Its Economical Best

CHOOSE THE SCRUBBER WITH THE SELF-SHARPENING BRUSH FEATURE

There's never a *dull* moment on brush performance with the *Finnell* Dry Scrubber. A flip of the switch reverses the motion of the brushes and re-sharpens them automatically! . . . eliminating the need for frequent changing of brushes by hand in order to maintain a good cutting edge. Automatic reversal of the brushes also helps keep them functioning efficiently by ejecting sticky substances that may otherwise tend to clog and slow up the cleaning process.

With this heavy duty *Finnell*, grease-caked floors can be cleaned in *one-tenth* the time required when hand-spudding, and far more thoroughly. Floating brush rings enable the two powerful scarifying brushes to get into indentations and grooves that rigid coupling brushes pass over and miss. And the low construction makes it easy to clean around and beneath equipment. The machine is adaptable to wet scrubbing, steel-wooling, waxing, and polishing. Ruggedly constructed, assuring long, trouble-free service. Has heavy duty G. E. Motor, oversize Timken Roller Bearings, special bronze worm gears—a quality product throughout, developed and produced by *Finnell*, originators of mechanical floor-maintenance equipment.

Clean floors aid safety underfoot . . . bolster worker morale . . . reduce fire hazards . . . speed trucking, and otherwise aid production. It *pays* to keep floors clean —especially with a labor-saving *Finnell* Dry Scrubber.

For free floor survey, consultation, or literature, phone or write nearest *Finnell* branch or Finnell System, Inc., 2505 East St., Elkhart, Ind. Canadian Office: Ottawa, Ont.

FINNELL SYSTEM, INC.

Pioneers and Specialists in

FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

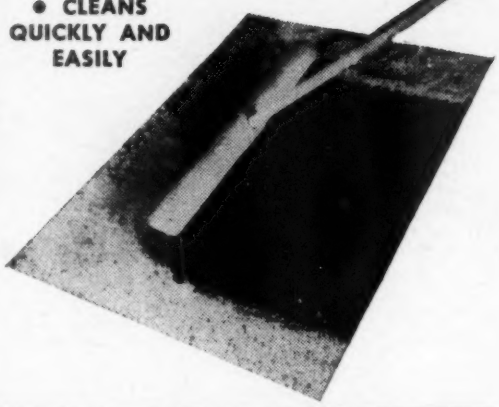
SAFE... STEP BY STEP!

■ In places that are accident breeders, install U·S·S Multigrip Floor Plate and make them safety spots.

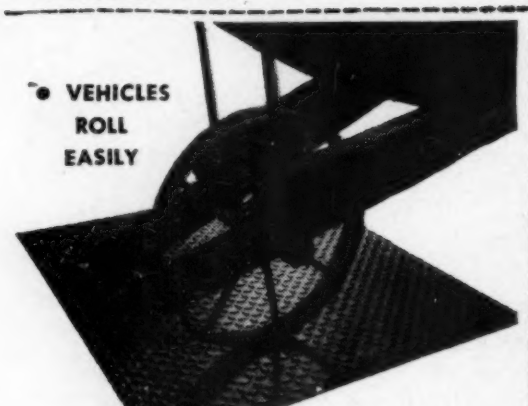
Multigrip's flat topped risers insure safe footing. Wet or dry, they prevent slips and falls, reduce lost man-hours. They keep vehicles rolling straight, prevent damage to trucks and other equipment.

Inquire at your nearest steel warehouse or write to us direct.

• EASILY MATCHED



• CLEANS QUICKLY AND EASILY



• VEHICLES ROLL EASILY

CARNEGIE-ILLINOIS STEEL CORPORATION
USS
MULTIGRIP FLOOR PLATE
UNITED STATES STEEL

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
7-312

UNITED STATES STEEL

until the time he would become eligible for a vacation, is still entitled to receive vacation pay on his separation from the company. While the plant had been closed as a result of a strike, the veteran accepted a job with the post office, which he continued until the strike was ended. He then obtained a sick leave from the post office and resumed his old job. He worked at his job in the plant until such time as he met the eligibility requirements for a vacation, then resigned to return to the post office. Since the employee met all the requirements for a vacation, it cannot be denied him because he returned to work with the intention of resigning to accept another position. Vacations are granted as a reward for past service and are not conditioned by any consideration of the intent of a person remaining in the employment of the company. (In re arbitration between National Screw & Manufacturing Company and United Automobile, Aircraft & Agricultural Implement Workers of America)

RIGHT TO BENEFITS DURING STRIKE

Although a veteran is not entitled to unemployment benefits during a strike, when the strike causes a stoppage of work, he may receive benefits after the plant has resumed normal operations despite the strike. Disqualification for benefits is based on idleness caused by a work stoppage in connection with a labor dispute in which the veteran has an interest. However, when the work stoppage ceases, benefits are held to be payable from that time even though the labor dispute still continued. (Winchester Repeating Arms Company, New Haven, Conn., decision of referee for Connecticut State Veterans Administration)

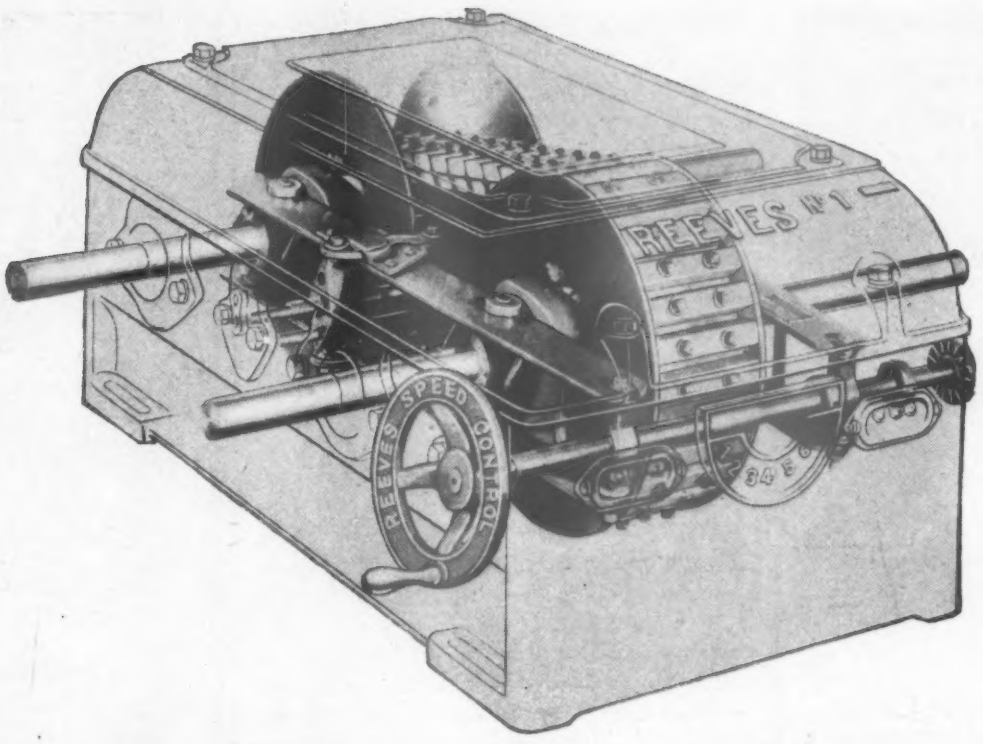
VETERAN MUST PROVE HE LEFT FORMER POSITION TO ENTER SERVICE

The burden of proving that he left his former position in order to join the armed services is on the veteran. Thus, when he was officially inducted into military service on September 3, 1943, but, at his own request was released from active duty and placed on inactive duty with orders to report on September 24, the veteran is unable to prove he left his job to perform training or service. The veteran's status at the time of his induction was only that of a discharged employee. Had the veteran notified the company on September 3 that he was to report to his draft board on that date, and that he was going into the Army and gave up his job, or even if he had answered his draft board's notice and gone into service immediately, or had he continued his job but left to answer his notice to report for service, his position could not be denied him. (McCarthy v. N & M Transportation Company, CCA-1)

Wage-Hour

PROFIT SHARING PAYMENTS PART OF RATE

Payments made by an employer to his employees under an annual profit shar-



Industry's Approved Method of Accurate, Variable Speed Control

The "missionary" work for variable speed control has been done. On every hand, in every industry where operating conditions are subject to change, there is abundant evidence to support its claims for increased output, improved, uniform quality and reduced cost.

Your problem, then, is one of selection . . . of determining which type and make of variable speed drive is best for your particular need. In making that choice, consider these facts about infinite, stepless REEVES Speed Control:

Manufactured by a company with more than fifty years' specialized experience in this specialized field. Design based on a proved operating principle. Ruggedly constructed for trouble-free operation and easy maintenance without special training or tools. Offered in a complete range of sizes, capacities and speed ratios, and furnished with any type of control . . . easily incorporated in new machine designs or applied to existing machines. Performance-proved in 260,000 installations and provided as standard equipment in 2,100 different makes of machines. Backed by a nation-wide engineering and service organization.

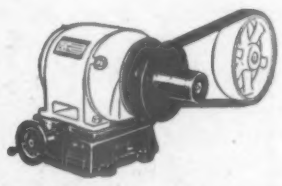
Think it over . . . this broad background of experience, this documented evidence of efficiency on any and all jobs . . . and we believe you will understand why REEVES is Industry's approved—*and proved*—method of variable speed control.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

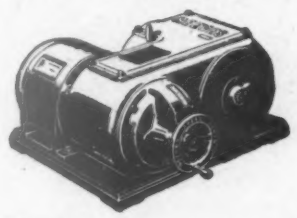
Recognized Leader in the Specialized Field of Speed Control Engineering

THE THREE BASIC REEVES SPEED CONTROL UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.



VARI-SPEED MOTOR PULLEY converts any standard constant speed motor to a variable speed drive within 4:1 ratio. Sizes to 15 hp.



MOTODRIVE combines motor, speed varying mechanism and reduction gears in single compact unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 15 hp.

Accurate Variable

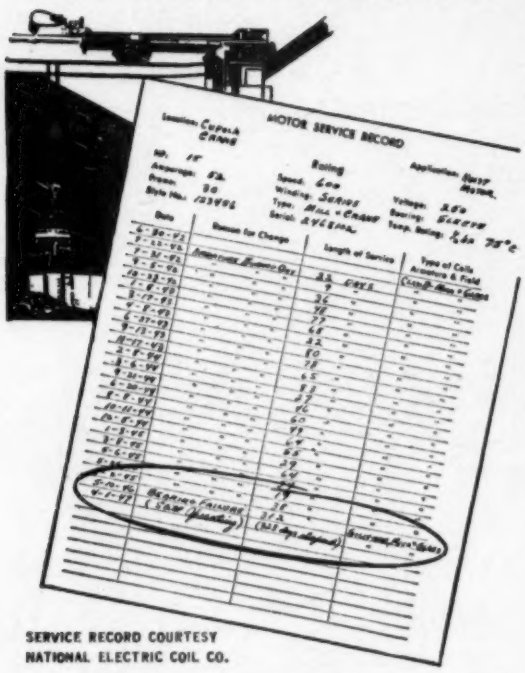
REEVES Speed Control

Gives the Right Speed for Every Job!

Silicone News

DC

DC Silicone Insulation CUTS MOTOR FAILURE 90%!



SERVICE RECORD COURTESY NATIONAL ELECTRIC COIL CO.

A cupola crane motor used to unload scrap in a large steel mill was designed for intermittent service. But steel hungry America kept it working full time to meet war and postwar requirements. Insulated with the best Class 'B' materials, this motor failed 22 times in about three years, giving an average service life of only 50 days.

Design limitations made it impossible to install a larger motor. Lost time, costly rewinding, and heavy maintenance expense seemed inescapable—until DC Silicone Insulation was introduced by Dow Corning.

National Electric Coil Co., of Columbus, Ohio, was one of the first to realize the advantages of Silicone-glass-mica insulation. Their engineers redesigned the coils of that motor using Silicone Insulation—DC 996 Varnish with glass and mica.

Then it operated almost continuously for 312 days—six times the average life with Class 'B' insulation—before a bearing failed, causing mechanical failure of the insulation. The motor was again rewound with Silicone Insulation and was still running April 1, 1947—after 323 days!

DC Silicone Insulation will keep hard-working motors running at least 10 times as long as Class 'B' insulation. That's proved by three years of tough tests and field service. DC 996 is further described in leaflet No. E 3-7.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN
New York • Chicago • Cleveland • Los Angeles
In Canada: Fiberglas Canada, Ltd., Toronto
In England: Albright and Wilson, Ltd., London

Dow Corning
FIRST IN SILICONES

LABOR DEVELOPMENTS *(continued)*

ing plan must be included in the regular rate of pay upon the basis of which overtime is calculated. Under a union contract, the employees were paid monthly a fixed share of the employer's annual profits, based upon the number of straight-time hours they worked. It is not necessary that the exact amounts that go to make up the "regular rate" of pay be known at the time the work is done by the employee. The fact that these figures cannot be computed until a later date makes no difference in computing the regular rate. Neither is it necessary that the regular rate of pay be uniform in amount from work week to work week. The amount may fluctuate because subject to different component factors, such as profits, which are variable, or the amount of production, and the size of dividends. Nor is it important that the shares of profits, or bonuses, paid to the employees are unrelated to their classifications, rates, and standards for jobs, as set up in the contract. (Walling v. Wall Wire Products Company, CCA-6)

VOLUNTEER WORK DURING LUNCH PERIOD IS COMPENSABLE

A salaried employee, hired with the understanding that he was to get half an hour for lunch each day and who subsequently volunteered to work through his lunch period, is entitled to compensation for such "work time," since it was in excess of the time agreed upon when he was hired. An employer's responsibility to pay for time worked by an employee during his lunch period may not be waived, since the employee rendered valuable services during such periods. Since the law requires that every employee is entitled to a lunch period, the time worked by an employee during his meal period is over and above the agreed-upon hours, and employee is entitled to be compensated therefor. (In re arbitration between Hertz Pharmacy, Bronx County, N. Y., and Retail, Wholesale, & Department Store Union, Retail Drug Store Employees Union)

PREPARATORY ACTIVITIES OF GUARDS HELD WORKING TIME

Plant guards are entitled to pay for time spent on the premises changing clothes, standing roll call and inspection, receiving instructions and assignments, walking to and from their assigned posts, and attending lectures and meetings. The plant guards spent 20 minutes daily in these preliminary activities, in addition to their regularly scheduled daily and weekly hours of work. Such time constitutes hours of work for which employees are entitled to unpaid wages. (Bartlett v. General Motors Corporation, USDC E. Mich.)

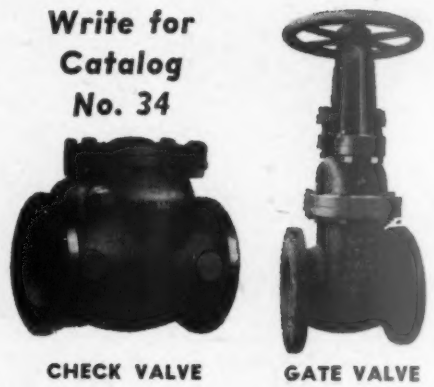
TRAVEL TIME IS NOT TIME WORKED

Travel time of engineers is not compensable work time where engineers were required to travel to various parts of the country on their assignments; the traveling occurred during normal work-

M H

HYDRANTS, VALVES

Write for Catalog No. 34



CHECK VALVE GATE VALVE

M & H valves are used in industrial plants for water, gas, steam, oil, chemicals and are furnished in all commercial sizes from 2" to 30", inclusive. They are cast iron body, bronze mounted, furnished double disc parallel seat or solid wedge. They are heavily proportioned and have a high factor of safety.

FOR FIRE PROTECTION

M & H Tapping Sleeve and Valve above are used to tap a main under pressure for a branch to automatic sprinklers, hydrants, etc. Cut-in may be made without interrupting water service. WRITE FOR CATALOG 40

OTHER M & H PRODUCTS

Fire Hydrants
Gate Valves
Tapping Valves
Special Castings
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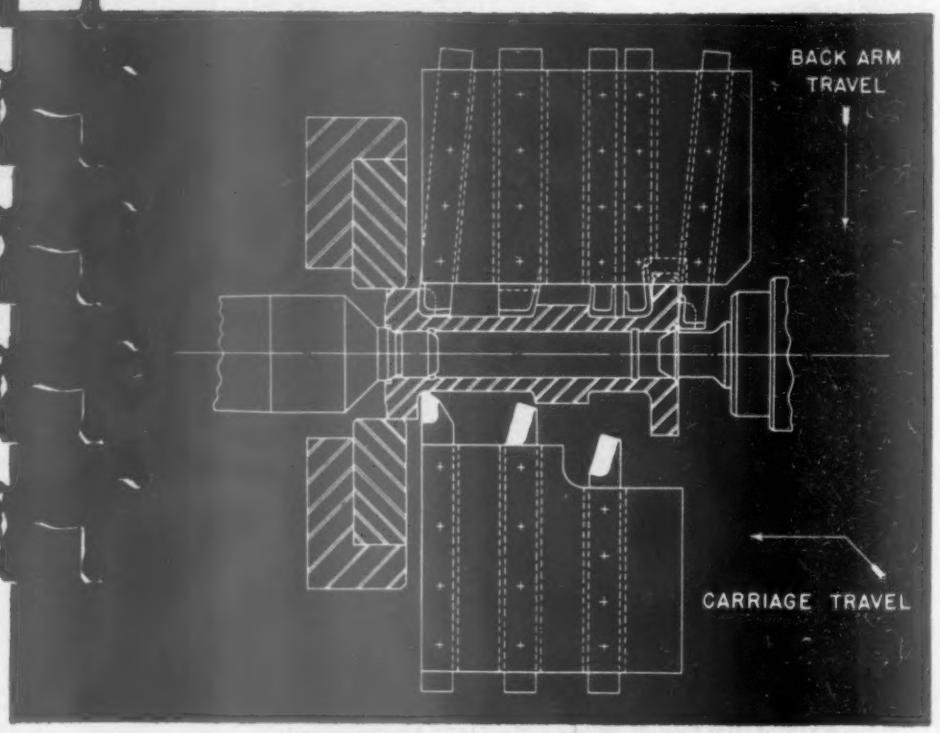

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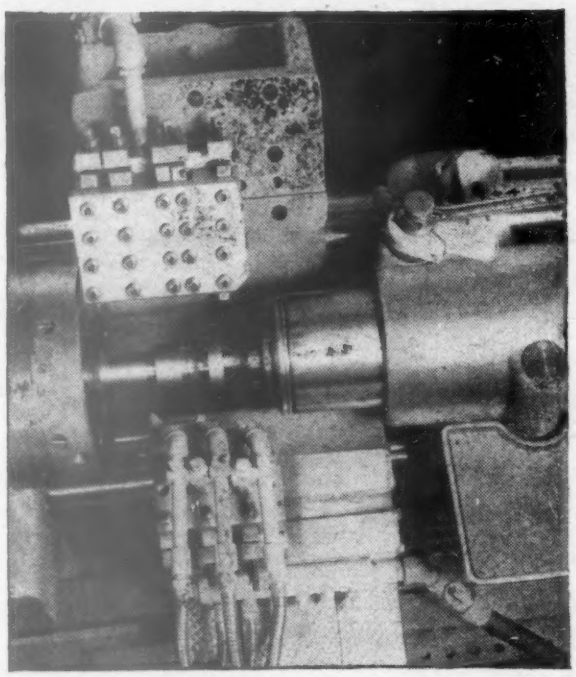
Carbide cutting tools have increased horsepower requirements as much as 300 per cent. They have increased cutting speeds 200 to 500 per cent.

Be skeptical of the production efficiency of your metal turning equipment. The chances are that turning accounts for 25 per cent or more of all machining time in your plant—that this is your major production expense.

There are cases in our files of savings of hundreds of dollars a month in the manufacture of a single part by the efficient use of carbide cutting tools on Jones & Lamson machines. Our Turret Lathes and Fay Automatic Lathes are designed specifically for the most efficient use of these tools.

Send for our folder "Turning Automobile Counter Gears". Or better yet, telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.



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ing hours of the day, and outside such hours and expenses of the traveling were paid by the employer, an industrial consultant. However, engineers are entitled to pay for time spent in attending conferences at employer's office since such time was spent at the direction of the employer. (Chepard v. May; USDC S. N.Y.)

TRAVEL TIME IN EMPLOYER'S CAR IS NOT TIME WORKED

An employee is not entitled to pay for time spent traveling to and from any of the jobs upon which he works. The distinction has been made that travel time spent by a worker in traveling from his home to his place of work is not to be included in the statutory work week, while so-called walking time spent on the employer's premises at the employer's instance is to be compensated for. The employee's claim that he met his superintendent each morning and was driven to work in the superintendent's car does not entitle him to pay for such traveling time. (Harrington v. Empire Construction Co., USDC Md.)

COMPROMISE OF WAGE-HOUR CLAIMS ALLOWED

Compromise settlements of claims growing out of Wage-Hour violations have been consistently rejected. However, once the claim is judicially settled and becomes a final judgment, it may be compromised. Such a compromise is not viewed as a waiver of workers' statutory rights. (Bracy v. Luray, USDC Md.)

PUNISHMENT FOR CONTEMPT DENIED

The court refused to punish for contempt isolated violations not specifically enjoined by earlier judgment. Among the violations were:

1. An accumulated hours plan.
2. Non-consideration of bonus plan in computation of overtime.
3. Non-payment of overtime to employees erroneously claimed piece-workers and exempted.
4. Failure to keep required records.

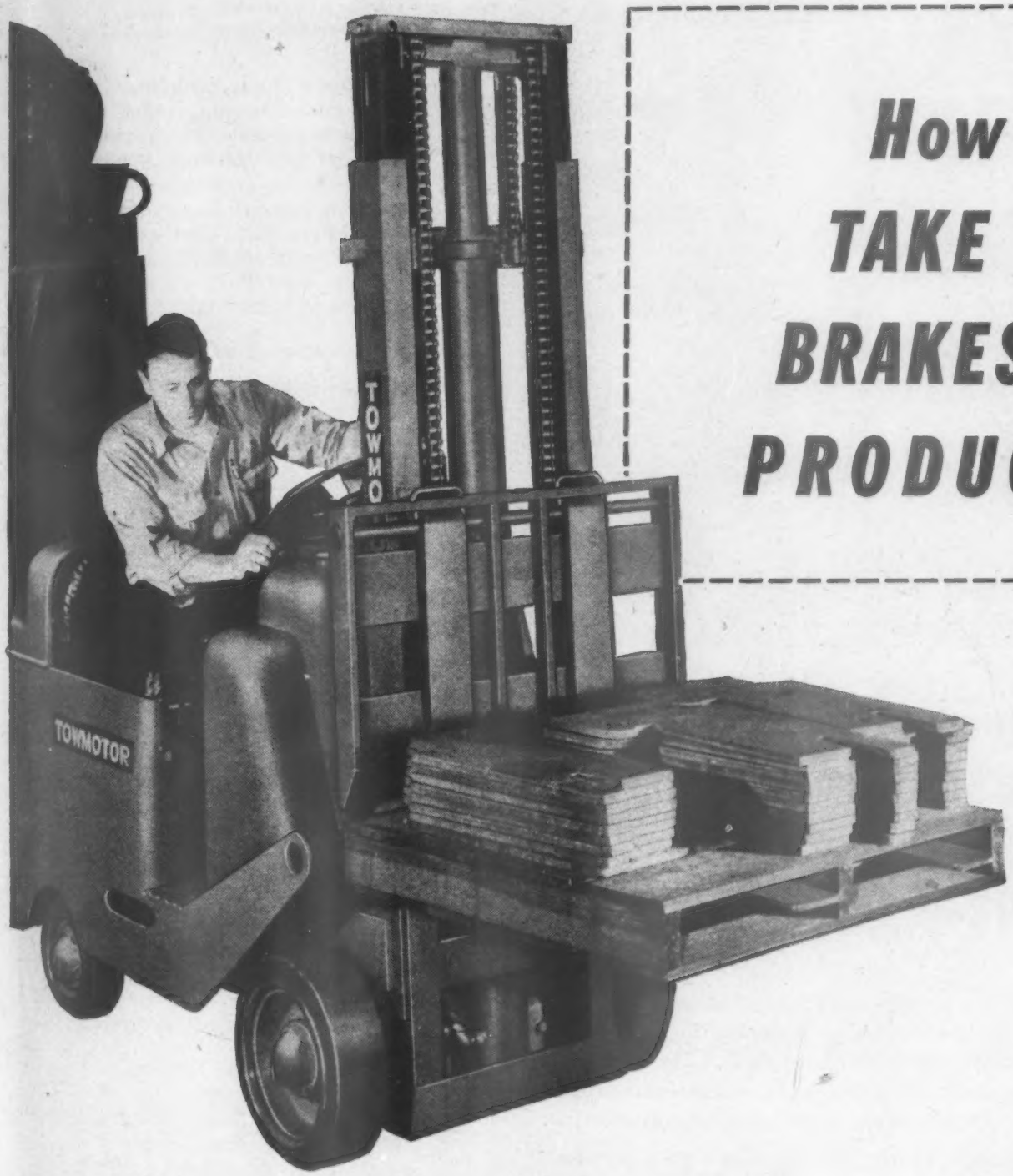
To justify punishment for civil contempt, there must be some evidence of willful and intentional violation of a court order. (Walling v. Jacksonville Paper Company, USDC SD Fla.)

LABOR-MANAGEMENT RELATIONS

*MANAGEMENT'S RIGHT TO SCHEDULE WORK WEEK

Contract clause stating "days of relief shall be established by the management and every effort will be exerted by the company to establish the days of relief in accordance with the desires of the employees," does not require the employer to discuss proposed revisions in the work week with the union, but only requires that the employer give due consideration to the desires of employees

* In this classification, items marked with an asterisk also are considered to be trend indicators.



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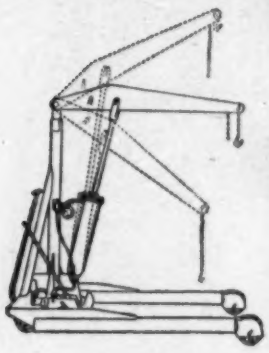

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affected by such changes. The union cannot claim that the contract does not require employees to perform work on Saturday and Sunday against their wishes, since they would then be negating management's contractual right to reschedule work. (In re arbitration between New Bedford Gas & Edison Light Company and Brotherhood of Utility Workers of New England)

***DISCONTINUANCE OF OVERTIME**

An employer's discontinuance of overtime for all workers in a department, immediately following notice from the union of the pendency of their petition for certification as the collective bargaining representative, is not discriminatory toward certain individuals, nor can the board require back pay for unworked overtime.

An employer cannot be charged with discrimination toward certain union members when his action affects union and non-union workers similarly. The Wagner act was passed for the protection of employees and not to punish the employer, nor does the law impose any obligation to favor union employees over others. (NLRB v. Winona Textile Mills, CCA-8)

***MANAGEMENT'S RIGHT TO GRANT WAGE INCREASE**

An employer may be charged with violating the Wagner Act for granting general pay increase to his employees without consulting the union which is the duly constituted bargaining representative. The court concurred with the National Labor Relations Board in holding that the granting of a wage increase under those circumstances is intended to undermine union prestige at the plant, and constitutes a direct appeal to the employees to disregard the union and to accept the terms of employment imposed by the company. Through such conduct, the board pointed out, the employer indicated his determination to deal with his employees directly rather than through their representatives and, therefore, was found to be interfering with the exercise of the rights guaranteed his employees. (NLRB v. Winona Textile Mills, CCA-8)

An employer who granted a unilateral wage increase 3 weeks before the employees' election for a collective bargaining representative, cannot be charged with preferential treatment toward the union winning the election if the winning union neither claimed nor received credit for the increase. The board held that this case was unlike others, in which it ordered elections set aside where two or more unions appeared on the ballot and one emerged victorious after the announcement of a pre-election wage increase. Whereas, in other cases the employer's conduct was found to have favored one union more than the other, here the wage increase did not indicate employer preference. In fact, the increase having been granted without consultation with the union, the

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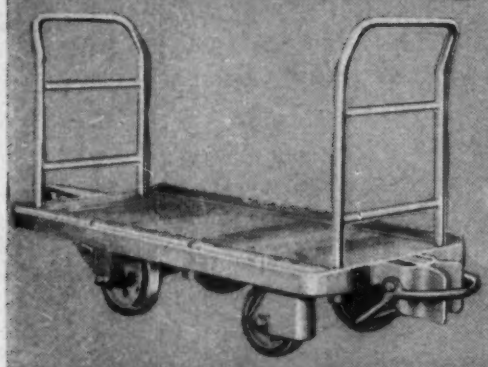

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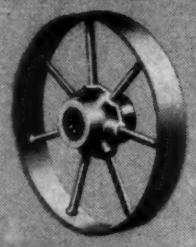

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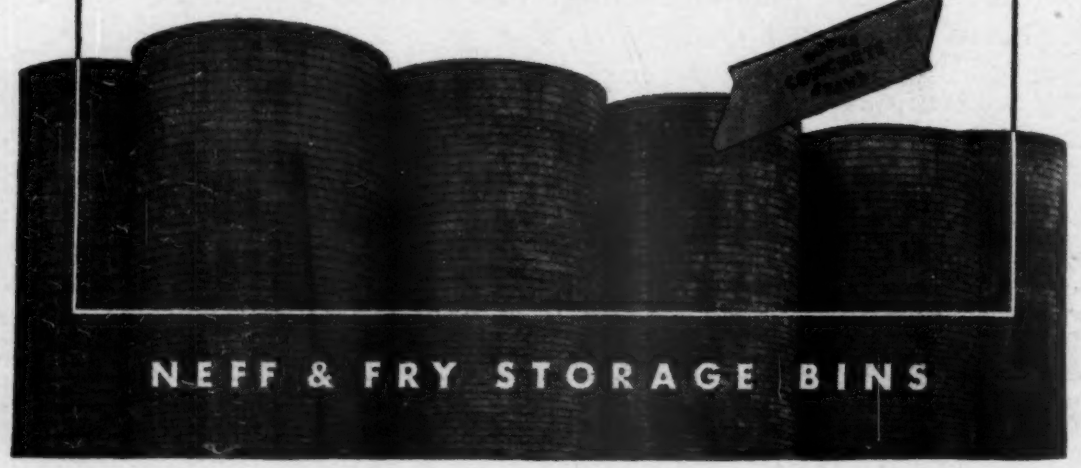

NEFF & FRY STORAGE BINS

winning union informed the employee on the eve of the election that the wage increase was intended by the employer to discredit the union. (Aurora Wall Paper Mill, Inc., NLRB)

*MANAGEMENT'S RIGHT TO GRANT BONUS

An arbitrator ruled that an employer may grant a bonus to non-union employees without being subject to a charge of discrimination only where no inequities were created by management's action. The union contended that the bonus extended to non-union employees constituted a discriminatory action, in that the company's criterion of eligibility for bonus, which was not membership or non-membership in the union but inclusion or exclusion from the bargaining unit, was unjust. The union pointed out that the contribution of an employee to the company does not vary between members and non-members of the union.

In justifying his award, the arbitrator stated that the criterion used to determine who was to get the special adjustment was not membership or non-membership in the union but rather bargaining-unit coverage and non-bargaining-unit coverage. As proof that the company used the latter criteria of eligibility, it was shown that no non-union members who were in the bargaining unit received the adjustment. Management is free to make adjustments to persons outside the bargaining unit provided it can show that no sharp inequity is created by the exercise of that freedom. (In re arbitration between Plymouth County Electric Company and Plymouth Gas Light Company and Brotherhood of Utility Workers of New England)

*MANAGEMENT'S RIGHT TO REPORT PROGRESS OF NEGOTIATIONS

An employer may send letters to his employees during negotiations with the union giving them an accurate report of the negotiations, provided such letters do not contain any coercive statements or attempt to induce the employees to abandon the union. The board found that the employer's letters to the union did not constitute bargaining with the employees on a basis apart from the union, since he was simultaneously conducting frequent meetings with them to discuss new wage terms. The employer made no direct offer to his employees in the letters; he merely called facts to the employees' attention, telling them, as he had told the union already, that he could not meet the industry-wide demand which had prompted the union to go on strike. The company, however, continued to bargain during the negotiation meetings with the union, some of which took place during the strike. (United Welding Company and United Steelworkers of America—NLRB)

DISCHARGE HELD UNLAWFUL

An employer may not be accused of discrimination when he discharges em-

3 workers slipped and fell . . .

Results { LOST—488 calendar days.
LOST—$3,093.37 for compensation and medical expense.

3 CASE HISTORIES

1. A woman employee fell as a result of slipping on a wet spot on the floor. This fall caused the following expense and lost time.

COMPENSATION EXPENSE		MEDICAL EXPENSE	
1946	$899.00	1946	$71.00
1947	141.00	1947	None
Total of $1,040.00 to date.		Total of $71.00 to date.	

Up to the end of February this accident had caused a loss of 293 calendar days and was not yet closed.

2. As a result of defective footing on a ramp, a male employee fell, sustaining injuries to his back.

This accident caused a loss to date of one year and 91 calendar days and has cost a total of $1,563.00 for compensation and medical expense. The case is not yet closed.

3. A woman employee slipped on wet linoleum, fell and fractured a leg.

This accident caused a loss of 104 calendar days, $368.96 compensation expense and $50.00 for medical care. The case is now closed.

The information given above was taken from the files of a large textile mill.

"SAFETY-WALK" in a textile mill.

ALL OF THIS LOSS OF TIME AND MONEY—not to speak of the human suffering involved—might have been prevented, for a mere fraction of the money paid out for compensation and medical care, by slip-proofing all walkways and floor areas where slipping might occur.

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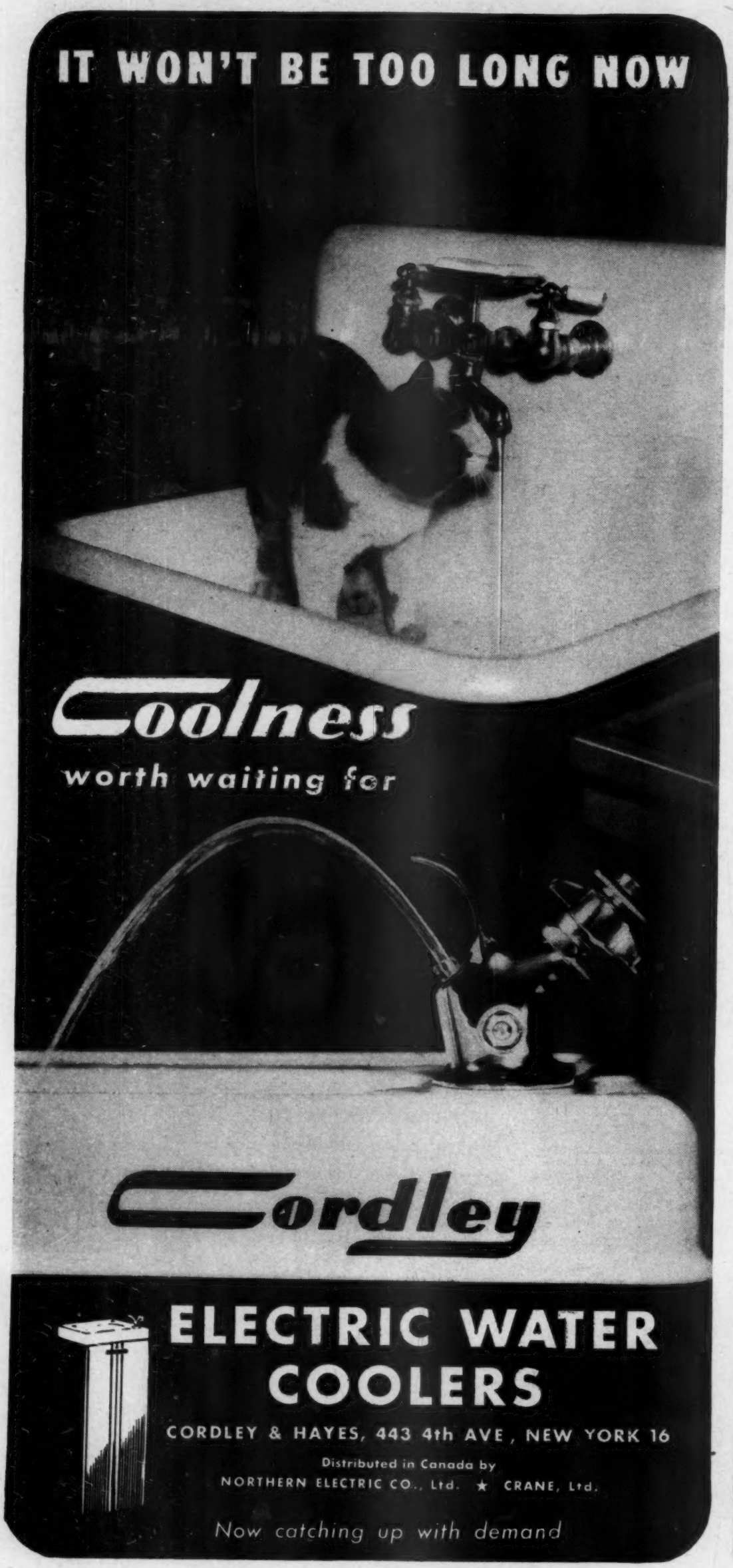

ployees who refuse to join the union, when a closed shop prevails. However, the discharge of an employee who is a member of the union, pursuant to the orders of the union charging the employee with dual unionism and for having violated her obligations to the union by testifying unfavorably at a hearing before the board, is unlawful. An employer may not discharge employees for having given testimony under the Act. The fact that the employer acted when the union insisted upon discharge under the closed shop clause does not save him, since he was aware of the reason behind the union's order. (NLRB v. American White Cross —CCA-2)

***VACATION RIGHTS FOR TERMINATED EMPLOYEES**

Despite the fact that a contract contains no provision granting vacation pay to terminated employees, an employee who is eligible for vacation at the time of his resignation is entitled to receive it, since a vacation is not only a rest period, but should be considered as additional compensation.

The company contended that the vacation is granted as a rest period, and that when an employee voluntarily quits, since he is no longer in the employ of the company, there is no reason why he should receive a vacation. The union took the position that the vacation provisions of the contract are a form of additional compensation, and even though an employee is not in the employ of the company at the time vacations are normally taken, he is entitled to it. The arbitrator pointed out that vacation pay is additional compensation, and that if an employee works the qualifying period specified in the contract, he becomes entitled to his vacation pay even if he voluntarily leaves his employment after so qualifying. (In re arbitration between Indiana Gas & Chemical Corporation and United Mine Workers of America, District 50)

EMPLOYEES TEMPORARILY LAID OFF ENTITLED TO HOLIDAY PAY

Holiday pay for Christmas and New Year's Day, when not worked, cannot be denied to employees temporarily laid off for lack of work shortly before such holidays, since such layoff does not terminate the employment relationship.

The contract provided: "There shall be the following paid holidays and the workers shall be paid at their regular rate of compensation for each such holiday, without working on such holiday, no matter on what day any such holiday occurs: New Year's Day, Decoration Day, July 4, Labor Day, Thanksgiving Day, and Christmas Day. But holiday pay without working on Thanksgiving shall not be granted unless worker also reports for work on the Friday following Thanksgiving Day."

The contract specified that "seasonal or other layoffs" shall not break continuity of service in determining eligibility for a "vacation" and "seasonal or other layoffs shall not affect continuity

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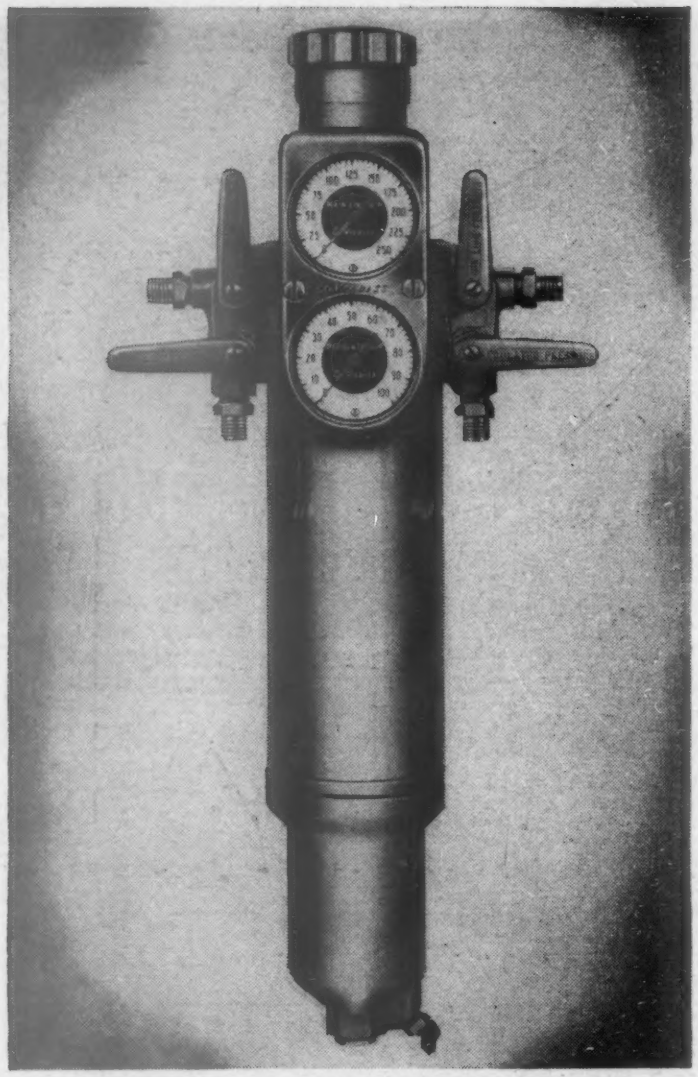

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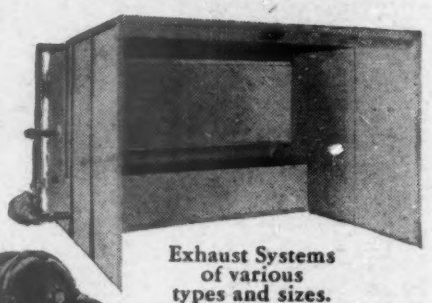

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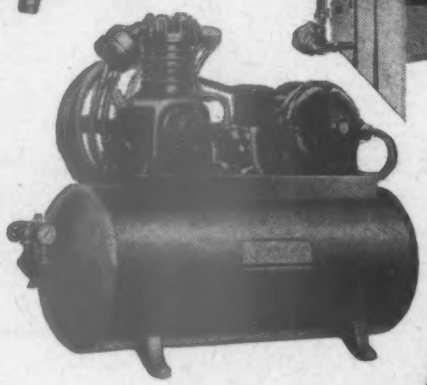

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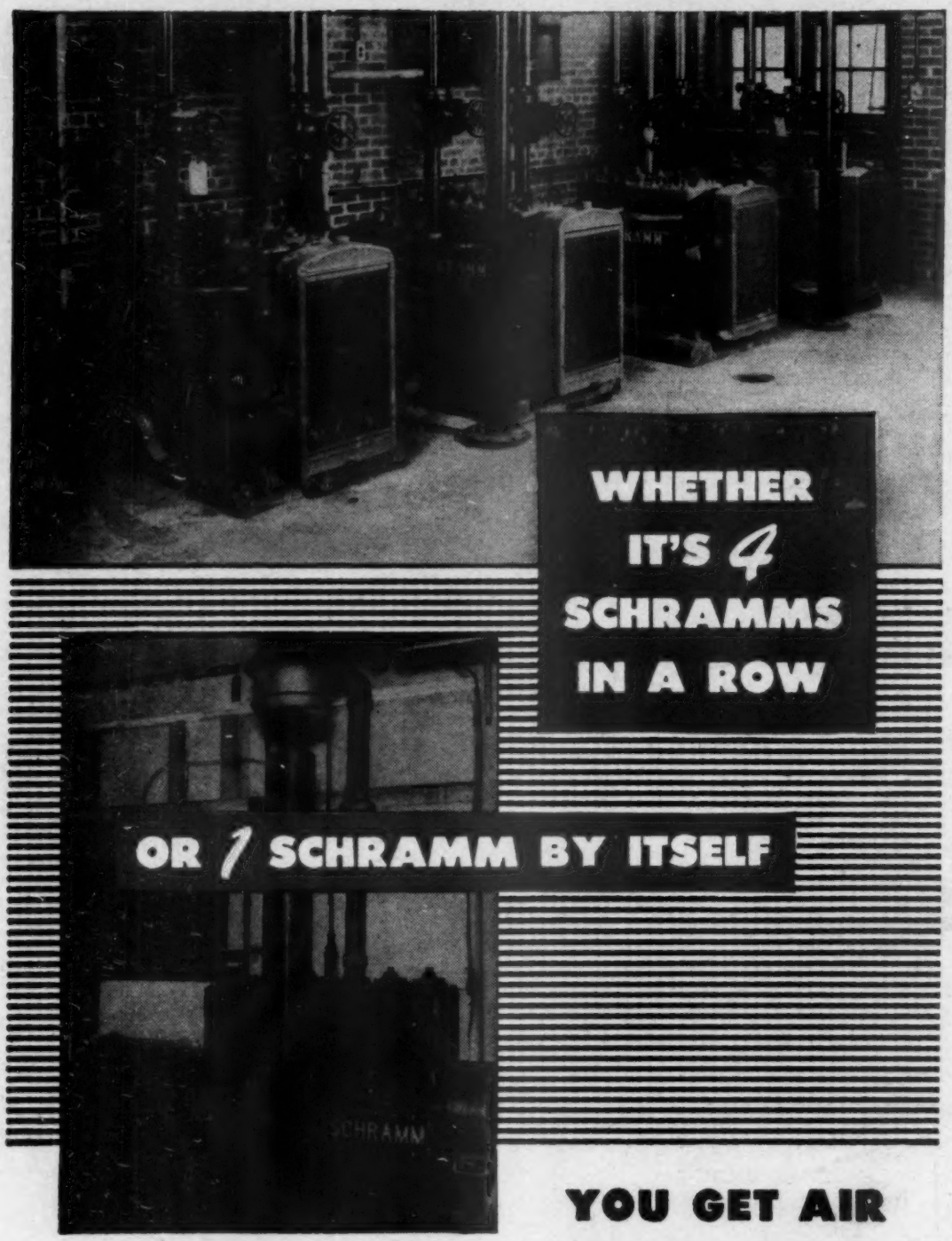

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of service." Although these clauses are limited to vacations and seniority rights, they indicate the general tenor of the contract. The contract also clearly granted pay for Christmas and New Year's Day unconditionally. (In re arbitration between Sternwild Knitting Mills, Inc., and Textile Workers Union of America)

***CALLING IN IS NOT "REPORTING"**

A contract containing a clause guaranteeing so many hour's work and pay per week to employees who report for work does not apply to those employees who thought it unsafe to pass a picket line around the plant established by another union and, therefore, telephoned in each morning from a store across the street from the employer's property. Such calling in each morning, an arbitrator ruled, does not constitute reporting for work, since the employees failed to reach the employer's property. The union's claim that it was not safe for them to risk physical harm by forcing their way through the picket lines was not justified in view of the fact that (1) the company had attempted to provide for the safety of these employees by offering police protection, and housing on the company's property, and by having secured a court restraining order to provide peaceful picketing; (2) the risk of physical violence, as mentioned in the union's position, only existed on the highway in front of the company's property and not on the property itself; and (3) the number of employees who refused to cross the picket line amounted to 14, which was a small percentage in relation to the 41 employees who reported for work without experiencing physical harm.

These employees, in acting the way they did, forfeited their claim to pay during this period because they did not actually report for work. Although the men did not lose seniority during this period, the time they took off was their own time, for which no compensation was due them. (In re arbitration between Warner Brothers Pictures, Inc., and International Alliance of Theatrical Stage Employees, International Photographers of The Motion Picture Industries, Local 659-AFL)

***EMPLOYER LIABLE FOR ANTI-UNION STATEMENTS OF SUPERVISORS**

An employer is liable for anti-union statements and conduct of supervisors who questioned the employees concerning their union views and preferences; inquired of one employee how he intended to vote in an NLRB election; threatened to remove the plant if it became unionized; warned that the employer would not sign a contract with the union without a protracted strike to the employees' economic detriment, etc. Despite the fact that the employer had issued neutrality instructions, and his pre-election speeches and letters to employees contained assurances against discrimination, his instructions were not

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Telephone: Rector 2-2668

addressed to the employees as a whole, and hence the employees were justified in believing that the supervisors, engaged in coercive conduct, were acting on behalf of management, particularly since a high ranking company official also participated in the anti-union conduct. The company did not take any precaution or any measures to dissipate the coercive effects of supervisors' conduct. Mere assurance against discrimination, embodied in the pre-election speech and letter, was held not sufficient to serve that purpose. (Wadesboro Full Fashioned Hosiery Mills, Inc., and American Federation of Hosiery Workers, NLRB)

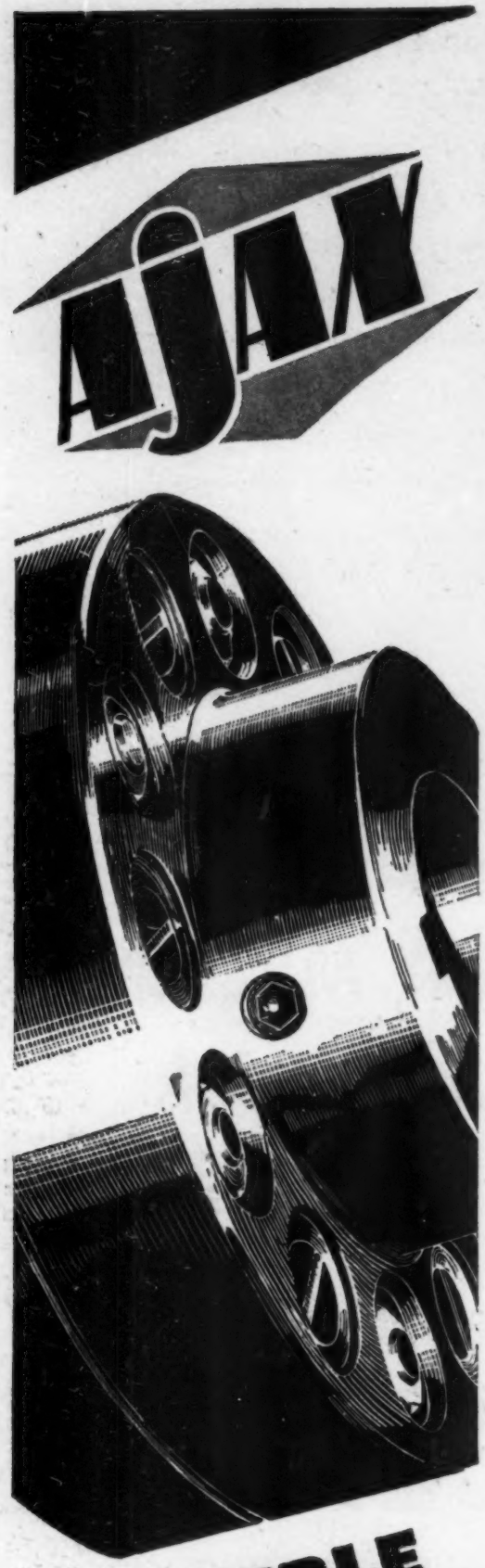
***SHOP RULES**

Where shop rules have been formulated the company should state them in simple language and have them posted, or a printed copy should be given to each employee. Such rules should be applied uniformly and fairly throughout the shop, without regard to union membership or the holding of an official position with the union.

In a grievance procedure following the company's reprimand of an employee, who was also an official of the union, for spending time in the toolroom talking to the union president, the union contended that the employee left his place of work in search of his foreman in order to report the need of a drum, and not finding the foreman in the toolroom, he paused for a few minutes to have a personal discussion with another employee, who was the local union president. In view of the fact that the shop rules have not been formalized, posted, or distributed to employees, a great deal of tension developed between the union, which contended that its officials were continually discriminated against by a too rigid application of the shop rules, and the company, which maintained that the local union officials are only being expected to observe the terms of the agreement plus a few very reasonable rules. (In re arbitration between Bethlehem Steel Company, Chicago Wire Goods Division and United Steelworkers of America)

GI TRAINEES IN SAME UNIT WITH REGULAR PRODUCTION EMPLOYEES

GI trainees engaged in various classifications of production work at a machinery manufacturing plant should be included in the same unit with regular production and maintenance employees. Despite the fact that an agreement entered into between the employer and the Veterans Administration covers their wages and working conditions for a specified period of time, the trainees are employed on production work in the same manner as other employees, intend to become ordinary employees at the completion of the training period, and have sufficient interest in collective bargaining to warrant their inclusion in the unit of production and maintenance employees. (Gullett Gin Company and United Steelworkers of America—NLRB)



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Protect direct-connected machines from unavoidable misalignment. No lubrication, no noise. Write for data book.

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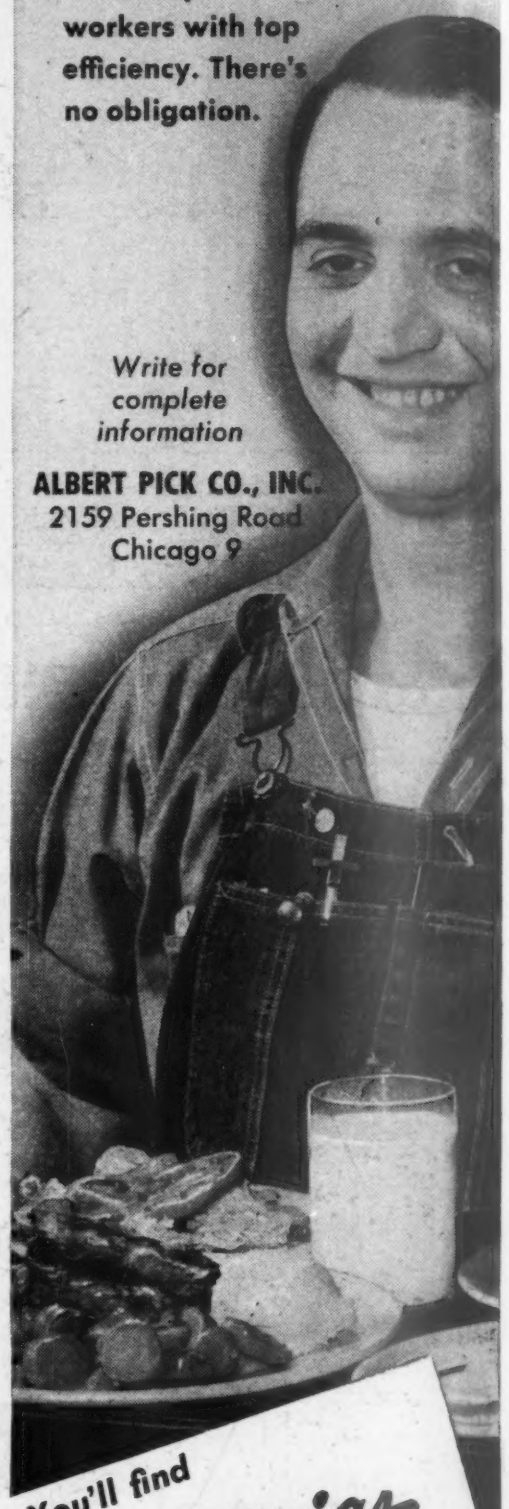
Nourishing food served at the plant pays off in stepped-up energy, better employe relations, better production. Let our engineers show you how PIX EQUIPMENT can serve any number of workers with top efficiency. There's no obligation.



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When you're glad you have a Snap-on

Installing a gear case cover with a Snap-on Speeder Wrench

This is the fast and efficient way to handle any job where there are many nuts to be serviced. Snap-on Speeders have been particularly designed for this specific purpose. The ample sweep radius gives your mechanics plenty of leverage to break nuts loose or draw them up tight... both handle grips swivel so that nuts can be spun on or off in a hurry... the long overall length permits reaching into the hard-to-get-at places for the fast and safe completion of tough jobs.

Snap-on tools are available only from the Snap-on representative who calls at your plant. He is one of many working out of Snap-on's 38 direct factory branches located in key cities from coast to coast. Write for the latest Snap-on catalog.

SNAP-ON TOOLS CORPORATION
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One of the skilled mechanics installing a gear case cover at the Unit Crane & Shovel Corp., Milwaukee, Wisconsin.

N•B•M BRONZE PARTS
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N-B-M engineers are not satisfied with castings that are just "good enough". They try to make improvements wherever possible: study the end-use of the product — figure out a better alloy, simpler coring method, stronger wall design or some other new technique that will improve performance for you.

All this extra engineering costs you nothing — saves you money in the long run through more efficient production and greater value.

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We put more service into them — you get more service out of them

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alchemists did not have GAS

Illustration from The Bettmann Archive

Even without GAS, essential productive fuel of industry, the alchemists laid the basis for modern chemistry—set the pattern of research for generations of scientists who followed them.

These modern scientists have produced miracles of which the ancients never dreamed. Not gold, of course, but—more precious than the alchemist's gold—the wonders of chemistry, metallurgy, physics, electronics, medicine. Fortunately, these researchers have GAS at their command. They depend on GAS for the exact modulations of heat required to produce chemical and physical changes.

Out of the laboratories, these modern miracles become the articles of commerce. In the production processes of thousands of industries GAS and modern Gas equipment duplicate their essential laboratory functions. Among available heat sources, the characteristics of GAS make it the ideal heating medium:

- **Controllability**
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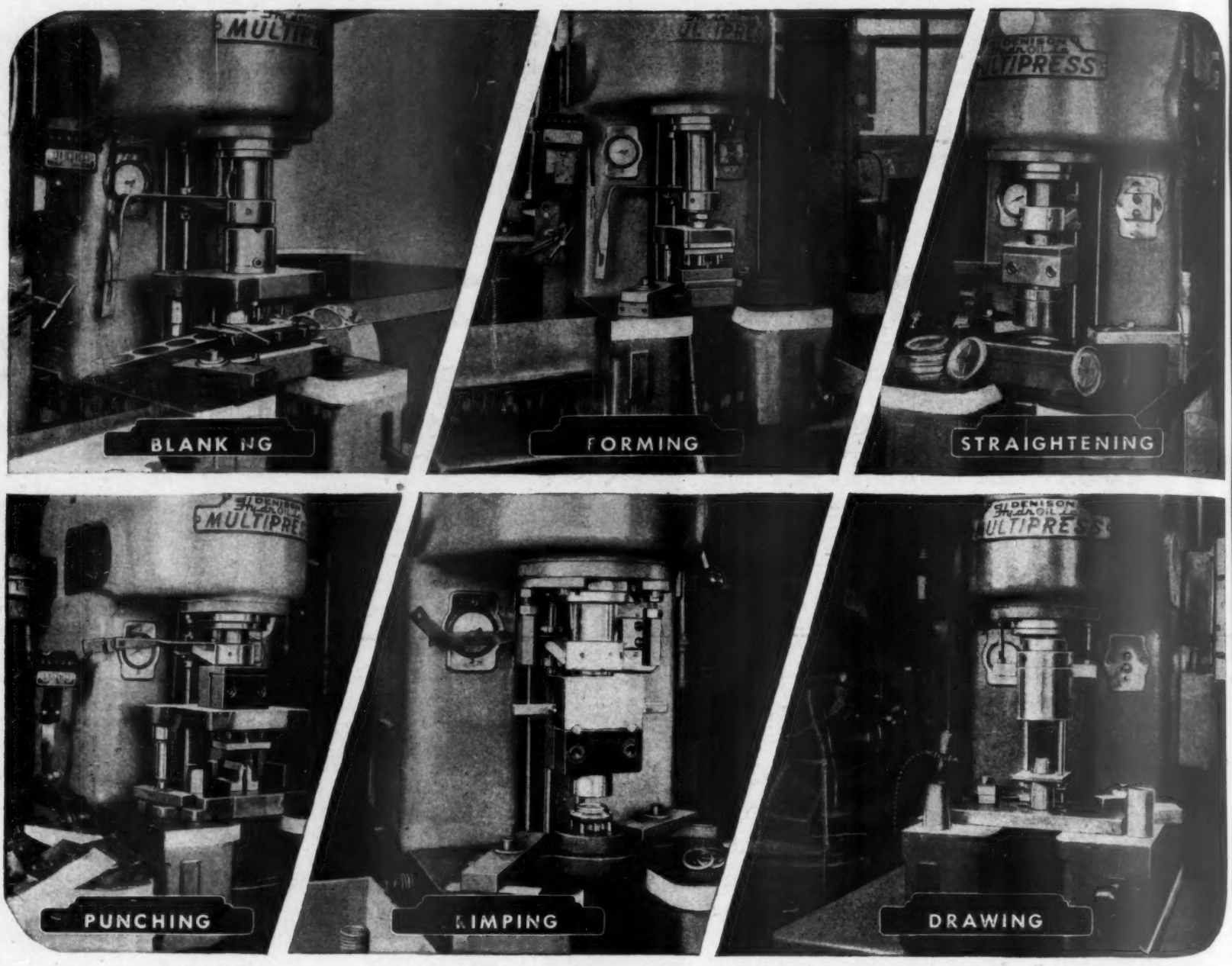
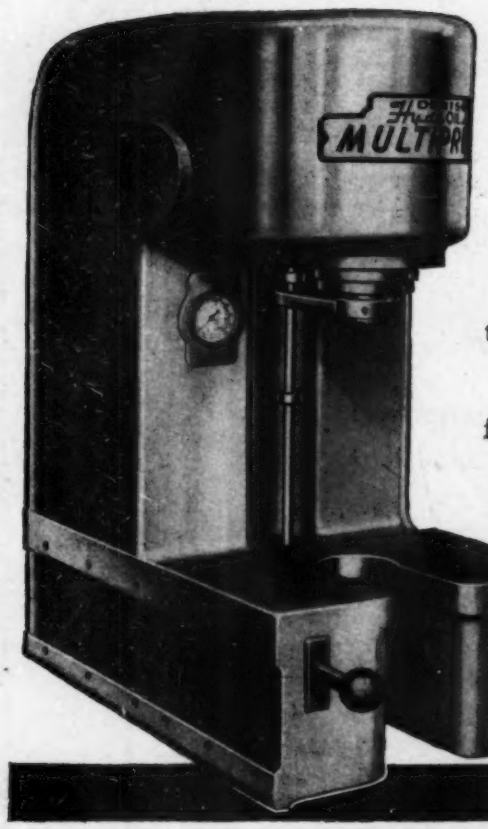
FOR ALL INDUSTRIAL HEATING



It's all in a day's work for MULTIPRESS



Here's proof, right from the production line, of the quick ease with which MULTIPRESS can be retooled for one high-speed job after another. With these six efficient tooling set-ups, The Buckeye Stamping Company, of Columbus, Ohio, adapts their MULTIPRESS units to changing production needs with minimum loss of operating time. All six operations could be handled on one MULTIPRESS in a single day! Using a special die adapter on the Multipress ram, die change time can be reduced to as little as five minutes.

To this simplified tooling, MULTIPRESS adds unusual operating flexibility. Six models, in 4, 6 and 8-ton capacities, offer a choice of manual and automatic tonnage, speed and cycling controls for almost any type of "pressure" job. Standard MULTIPRESS accessories include benches, side shelves, work-table extensions, a variety of bolster plates, and accessory tooling for indexing, pelleting, foil-marking and many other special operations.

Write for full details on this cost-cutting, production-boosting, bench-size tool of amazingly compact and efficient design.

THE DENISON ENGINEERING CO., 1154 DUBLIN RD., COLUMBUS 16, OHIO

DENISON EQUIPMENT in APPLIED HydrOILics

Advertisement

Services Offered

BUILDING MAINTENANCE. Blackhawk Porto-Power adapts to any span to lift sagged buildings, straighten building posts, etc., with tons of controlled hydraulic power.

CLAMPING. Standard clamp attachment adapts Porto-Power ram for clamping parts for riveting or welding.

CLOSE-QUARTER WORK. 2-ton Bantam Porto-Power provides moderate power for compact quarters. 4-ton midget ram works with low of 1⅝". Even the 50-ton ram needs working area of only 5" dia.

CONSTRUCTION WORK. Versatile hydraulic Porto-Power can be adapted to numerous operations such as forcing grooved wood flooring and sections into place, riveting culverts, straightening buckets, lifting equipment for loading, etc.

DIES SEPARATED. Porto-Power Rams serve in tool rooms for smooth, easy separation of dies.

ELECTRICAL SERVICE. Rigid pipe and conduit bent with Porto-Power Pipe Bender Power Unit. Also adaptable for lifting transformers and machinery, pulling drive pulleys on motors, and other work allied to pipe bending.

EQUIPMENT MAINTENANCE. Adaptable for push, pull, bend, spread, press, clamp, and straightening operations—Porto-Power serves all phases of equipment maintenance.

MACHINERY ALIGNMENT. One-man-operated Porto-Power handles heavy machinery easily and with safety because of remote control.

MACHINERY MOVED. Porto-Power toe-lift combination lifts heavy machinery without crowbars or extra manpower. Only a two-man job.

MAINTENANCE SERVICE. Shafts straightened overhead; frames on material handling machines straightened without dismantling; also spread heavy malleable conveyor links for replacement with Porto-Power.

MEASURING. Porto-Power equipped with gauge tests load bearing qualities of soil, sinks pilings to hold pre-determined loads, presses with cautionary force, weighs huge tonnages and tests materials.

MONORAIL BENT. Simple Porto-Power pull-chain combination bends monorail and angle iron.

PIN REMOVAL. Pins, bushings, bolts, or shafts removed and inserted with hydraulic Porto-Power.

PORTABLE HYDRAULIC POWER. All-directional, threaded rams of 2, 4, 7, 10, 20 and 50-ton capacities, with attachments for maintenance and production work. Only Porto-Power offers this service.

PRESS WORK. Porto-Power—adaptable for use in shop-built or special presses. Can be used for many types of press work including pressing of certain plastics.

PULLING DRIVE PULLEYS, GEARS and WHEELS, Porto-Power handles pulling operations with smooth, safe hydraulic power.

PUNCHING. Porto-Power can easily be adapted to sheet metal punching and other fabrication work.

SHORING. All-directional Porto-Power provides smooth steady pressure for safe shoring operations.

STRAIGHTEN CASTINGS distorted by heat treatment with powerful hydraulic Porto-Power.

TESTING. Gauge-equipped Porto-Power for use in laboratory or on construction or production jobs in testing welds and checking breaking point of materials, etc.

WEIGHING VAST TONNAGES. Hydraulic Porto-Power with gauge adaptable for checking weights of large, cumbersome structural members.

Investment Property

Only $157.50 buys the versatile new S-45 Postwar Porto-Power, complete with stand, press, 10-ton hydraulic unit, and attachments. Every plant needs this equipment for general service. An ideal tool for low cost production and maintenance work.

SAVE MONEY ON PIPE INSTALLATIONS—Porto-Power bends pipe and conduit up to 4" diameter. Eliminates extra cutting and threading and use of factory-formed ells.

PAYS FOR ITSELF, FAST. A profitable, money-making buy for every plant. Porto-Power serves in every department — handles 1001 tough jobs. The most versatile tool of its kind.

COST SAVER. Porto-Power has an unmatched cost-cutting record. Fast hydraulic power replaces slow, dangerous mechanical methods.

SIX HYDRAULIC RAMS. 2-ton Bantam, 4-ton Midget Ram, 7-ton Short Ram and the 10, 20 and 50-ton standard rams provide a complete range of hydraulic units adapting your Porto-Power to myriads of jobs.

Birth Announcements

R-263. The 4-ton "Thimblesize" Midget Ram is back to increase profits and cut costs for Porto-Power owners. A specialist for tight squeeze work because this powerful little remotely-controlled ram exerts force where other devices cannot be inserted.

TUBULAR STAND. Added portability is given to your Porto-Power by the new, handy wheeled stand. Strong and practical. Its two large trays bring the complete Porto-Power and other tools right to the job. Has four large wheels for easy maneuverability. Press for 10-ton ram is mounted on the stand. Saves time lost in walking back and forth to bring maintenance equipment on and off job.

Death Notices

HEAT. No need for heating and destroying the temper of metals on maintenance work. Porto-Power provides ample strength to bend and straighten heavy beams, conduit, etc., cold.

MECHANICAL DEVICES. Need for a variety of dangerous, back-breaking, mechanical jacks and devices is eliminated by Porto-Power. Attachments adapt Porto-Power to every type of lifting and leverage work.

SLEDGING. Porto-Power's smooth hydraulic power eliminates dangerous, damaging sledging and hammering.

Business Opportunities

CONSTRUCTION. Portable, safe, remotely-controlled Porto-Power provides on-the-spot hydraulic power for lifting, moving, clamping, and other operations. Helps meet deadlines and hold down costs.

BOOST THE EFFICIENCY OF YOUR MAINTENANCE DEPARTMENT—A work shop on wheels—Porto-Power with its wide range of attachments adapts itself to 1001 different jobs. Increases your range of work and cost-cutting opportunities.

EQUIPMENT MAINTENANCE IN THE FIELD — Service Managers recommend Porto-Power to service shops for profitable, fast work on tractors, motor vehicles, road machinery and other equipment.

EMERGENCY SERVICE. Porto-Power is on-the-spot repair equipment for emergencies. Easily transported and capable of applying tons of power, with the versatility of human hands.

PRODUCTION. Many operations can be speeded up by the application of low-cost Porto-Power. Its ample, smooth hydraulic power can be adapted for quick, accurate activating power for machines. Also for press operations.

Equipment for Sale

BENCH PRESS. A sturdy, 4-post Porto-Power press, designed for easy mounting on work benches. Used with the 10-ton Porto-Power ram, this makes an ideal press for dozens of production and maintenance jobs.

COMING SOON. An array of sensational new Blackhawk Porto-Power developments are on their way. Not in the blueprint stage, but ready for production. Adaptable to your present Porto-Power equipment, this new equipment will increase the versatility of your Porto-Power and help you earn even greater profits.

COMPLETE KITS OF PORTO-POWER EQUIPMENT — You can select hydraulic units that fit your job requirements. The S-79 kit brings you 20-ton equipment; S-31 and S-45 bring you 10-ton assortments, etc. See your Blackhawk Industrial Supply Distributor for the complete story on this big line of hydraulic service tools.

Free Offers

ASK FOR DEMONSTRATION. See for yourself how Porto-Power adapts itself to every type of push, pull, bend, press, clamp, spread, and straightening operation. Learn how it works in many departments of your plant.

CALL YOUR DISTRIBUTOR. Your Blackhawk Industrial Supply Distributor is prepared to give you full information on Porto-Power. Be sure you are on his list so you can get early delivery of your Porto-Power.

WRITE for new Blackhawk Postwar Porto-Power Catalog containing full information on the many new developments. It's a complete guide to Porto-Power profit opportunities. Blackhawk will also send you new catalogs on Hydraulic Jacks and Wrenches.

Yes! **Porto-Power*** **IS Classified . . .**

Porto-Power is classified as a complete system of portable equipment for applying hydraulic power to push, pull, clamp, spread, bend, lift, and press jobs. It replaces costly, dangerous, damaging mechanical devices and back-breaking methods which were formerly necessary. Cuts maintenance, production, and construction costs. No other equipment can match Porto-Power's versatility. Plan now to become Porto-Power equipped!

**There is only one Porto-Power . . . it is made by Blackhawk. Trade Mark Registered.*

A Product of **BLACKHAWK MFG. COMPANY**
DEPT. P2757, Milwaukee 1, Wisconsin

BLACKHAWK

See this
FLUSH FASTENING
WITH HEX-SOCKET ADVANTAGES

ALLEN
FLAT HEAD
CAP SCREWS

(1) Flush top surface with no gap between screw head and surrounding metal.

(2) Extreme rigidity of grip, because angle of head helps lock screw in place by drawing down on a conical surface.

(3) Firmer hold on thin plates of metal, by more binding surface under the head than in fillister type or cheese-head screws.

(4) Shallower countersink — less weakening of metal — when used for fastening a relatively thin plate.

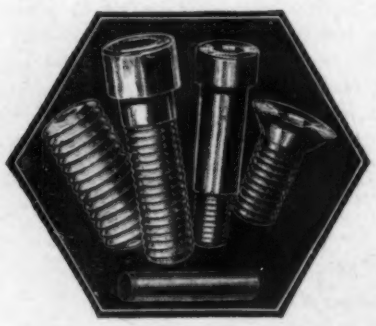
(5) Positive engagement of hex key transmits power for tightest of set-ups without slipping, reaming or side play.

(6) Maximum strength of screw itself assured by *"pressur-forming"* of special-analysis ALLENOY steel. Threaded to a high Class 3 fit.

(7) Speed in assembly provided for by use of Allen hand drivers and key blades for power drivers.

Stock sizes from No. 4 to ¾" diameter; ¼" to 3" length.

Order of your local ALLEN Distributor, — or ask him for samples for try-out.



THE ALLEN MFG. COMPANY
HARTFORD, CONNECTICUT, U. S. A.

THEY SAY AND DO

MAKING MERIT RATING APPLY IN A SENIORITY SYSTEM

GUY WADSWORTH, Vice-President, Southern California Gas Company, addressing the American Management Association

What practical quality controls can be exercised within a hard-and-fast seniority formula to see to it that employees are promoted only when their performance merits it? And what can be done about non-producers who should not be on the job, and who certainly deserve no special protection, irrespective of term of service, when layoffs occur? I believe that our companies have developed satisfactory answers to both questions.

First, because we have established lines of promotion, we know when we hire someone for a beginning job just what possible promotions are in store for him.

Second, we reinforce our initial employee selection job with a rigid follow-up during our probationary period of six months. The supervisor is required to observe the newcomer at work, and to develop an affirmative or negative recommendation with respect to retention of the new employee well before expiration of the six months.

Third, we use what we call a "field review method" of employee evaluation in which, in lieu of a check item rating device, we discuss in ordinary cross-table conversation the performance of each employee with his supervisor.

GIVING WORKERS JOB SATISFACTION

EDWARD T. CHEYFITZ, Assistant to President, Motion Picture Association, addressing the American Management Association

I have been asked to answer the question, "What does an employee want to know?" . . . I don't think I should be divulging any secrets if I said that the worker's first interest is wages. He wants to know and understand the company's wage structure, but especially he wants to know the reasoning behind the wage structure. . . .

Wages, opportunity, security—these are vital questions, and employees want to know all about them. Company information programs might well start with these subjects. . . .

Mass production with its specialization, with its remoteness of task to end product, has taken much of the creative interest out of work. And this lack of creative interest—of work satisfaction—is a festering point that gives rise to much of our industrial strife.

Some say that monotony and boredom are inherent in the mass production process and that if we want the material results of mass production, we shall have to pay the spiritual price. That may be so. We may find that there is little we can do to put more creative interest into the work of millions of Americans. But I know there is much we can do to develop compensating satisfactions.

Many companies are doing a splendid pioneering job in this field. Some are shooting for the goal of giving the worker a greater stake in the success of the business. They try to make him feel that he is a part of the enterprise. . . . The techniques may vary from profit sharing to multiple management. . . .

Other companies place the emphasis on recognition of the individual. They emphasize the relationships around the job with the hope that status for the worker will compensate for job boredom.

NATIONALIZED INDUSTRY LEARNS THE HARD WAY

McGRAW-HILL WORLD NEWS, Paris, France

France is awakening to the fact that nationalizing an industry is no guarantee of efficient and profitable management. With the new National Assembly now in session, several nationalized firms have received or are due to get a raking-over in regard to their management practices.

A two-man subcommittee of the Assembly's Finance Commission recently blasted conditions in one of the chief state-owned aircraft firms, Compagnie Nationale des Constructions Aeronautiques du Sud-Est. The company had applied for a state subsidy to cover its 1946 deficit of $5,000,000.

The subcommittee learned that the firm calculated piece rates according to the number of pieces made by the worker, and not according to the number that passed inspection. "Quality control," it added, "was found completely insufficient."

Policy of the company's former president also came in for a lashing. It was characterized as "a facility for excessive camaraderie leading to the appointment of incapable or ineffective co-workers up to the highest ranks of the hierarchy, who gave no leadership whatsoever and sought only to avoid being unpopular."

A good part of the company's loss was caused by a policy of branching out into non-aircraft production in order to give work to an excessive number of employees. The subcommittee recommended firing up to 40 per cent of the company's working staff.

On another sector, the Premier recently appointed a special commission to investigate the regularity of the books and the policies of the board of directors of the national coal mine company. No one knows today the exact financial condition of the mines, but it is reported their monthly deficit has been running at about $8,500,000.

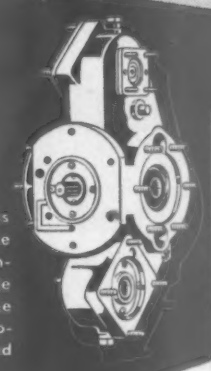
A considerable part of the coal mines' present financial trouble arises from the large wage boost granted last summer. At that time the Communists in charge of the coal mines under the Minister of

We Like Tough Jobs!

TAKE A LOOK AT THE McDONNELL PHANTOM

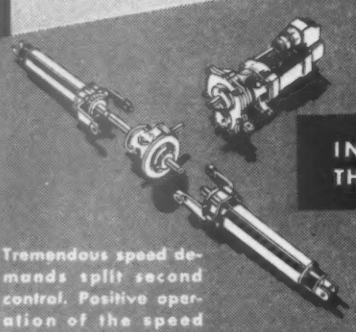
FOR INSTANCE

IN THE ENGINES THAT POWER IT



FooteBros produces this accessory drive for the turbo-jet engines which provide power to operate pumps, starter motors, generators and other equipment.

IN THE SPEED BRAKE THAT GIVES CONTROL



Tremendous speed demands split second control. Positive operation of the speed brake is provided by this assembly.

HERE'S the fastest thing with wings that ever took off from an aircraft carrier's flight deck—the McDonnell Phantom!

Powered by two turbo-jet engines—streamlined to achieve a top flight speed of over 500 miles per hour—it still has the stability and control characteristics at slow landing speeds comparable to conventional carrier-based planes.

This is another major development in modern aircraft in which Foote Bros. "A-Q" Gears and Power Units are playing a part.

On the axial flow turbo-jet engines the accessory drive units are produced by Foote Bros. In the wings of the Phantom, Foote Bros. actuators supply immediate response in raising and lowering speed brakes—so important in the control of this swift plane.

Manufacturers of many types of industrial equipment requiring gears of extreme precision are finding in Foote Bros. "A-Q" (aircraft quality) Gears an answer to problems of greater efficiency, higher speed, unusual compactness, light weight and low noise level.

Manufacturers of equipment requiring absolute control of operations from a remote point may find an answer in Foote Bros. Power Units and Actuators. These units are individually engineered to the job they are intended to do, and assure compactness, light weight, and, above all, positive control of linear or rotary motion within an exact time cycle. They also provide the extremely accurate mounting of "A-Q" Gears—so essential if the full benefit of their precision is to be realized.

Of course, you as well as thousands of other leading manufacturers will continue to look to Foote Bros. for industrial gears of all sizes and types and speed reducers in a wide range of ratios as you have since 1859.

Two engineering bulletins, one on "A-Q" gears, the other on Power Units, offer many suggestions on new developments in application of power. If you have not received copies, mail the coupon below.

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
4545 South Western Boulevard • Chicago 9, Illinois

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. I, 4545 S. Western Blvd., Chicago 9, Ill.
Gentlemen: Please send me Bulletins on:
☐Power Units ☐Aircraft Quality Gears

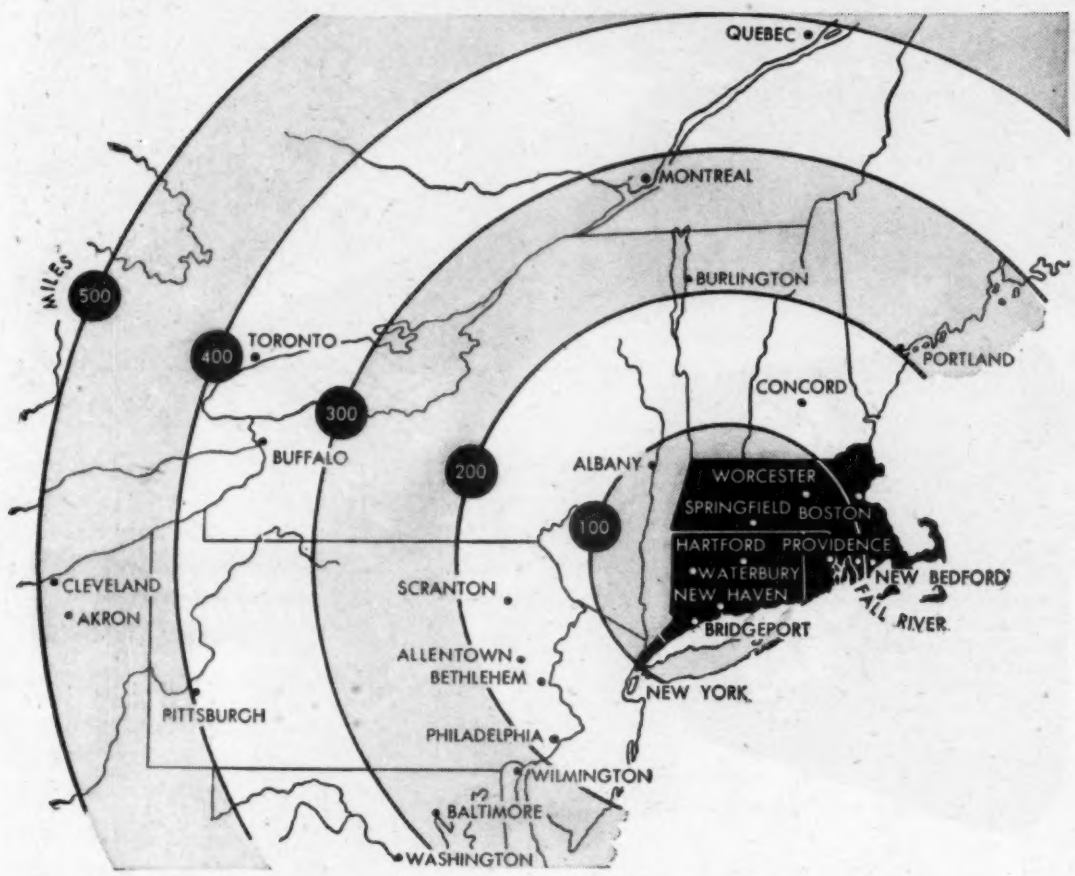
Name.....

Firm.....

Address.....

City.....State.....

Aiming for More *Customers?*



41.2% of all U. S. retail sales are made within 500 miles from the center of Southern New England!

NO MATTER where you locate on the New Haven, you'll be near a major portion of America's buying power.

38.1% of the nation's population lives within 500 miles from the center of Southern New England. This area earns 54.2% of America's industrial wages and salaries; pays 50% of individual U. S. income taxes; holds 72.4% of the country's savings deposits; bought 41.2% of all goods sold across retail counters in 1945.

Being close to this tremendous purchasing power is just one of many advantages enjoyed by industry in Southern New England.

For more facts to help you plan for future profits, write for a free copy of "SOUTHERN NEW ENGLAND FOR TOMORROW'S INDUSTRY." Address: P. E. Benjamin, Mgr., Industrial Development, New Haven Railroad, Room 201J, 80 Federal St., Boston 10, Mass.

THE NEW HAVEN R. R.

SERVING NEW YORK AND THE GREAT INDUSTRIAL STATES OF MASSACHUSETTS, RHODE ISLAND AND CONNECTICUT

Industrial Production declared the increased wages could be paid out of profits and higher man-hour output.

Faced with these conditions, the government has decided to make an effort to find out at least how things stand with its own enterprises. A decree recently issued requires all firms owned 20 per cent or more by the state to issue periodically public financial reports based on a uniform accounting plan. However, the decree does not go into force for two years.

1947 LIGHTING CONFERENCE ANNOUNCED

Lighting men are going to become well acquainted with the emblem accompanying this notice.

"Plan Tomorrow's Lighting Today—Stevens Hotel, Chicago, Nov. 3-7, 1947"

is the seal's message. It will appear in many exhibitors' advertisements during the coming months.

Its purpose will be the important task of piloting the way to the 2nd International Lighting Exposition and Conference, which is sponsored by the Industrial and Commercial Lighting Equipment Section of the National Electrical Manufacturers Association.

UNION ADVERTISES GOOD INDUSTRIAL RELATIONS

A labor organization pointing with pride to its ability to get along with management is a pleasant surprise.

The Minnesota Federation of Labor-AFL did that in a series of advertisements. Paid for by nickel-and-dime contributions, the advertisements told how AFL folks in Minnesota "get along with our bosses." Key points in the copy were: "We believe in private enterprise, not government in business. We want the boss to make money and expand his

LEWIS-SHEPARD TRUCKS

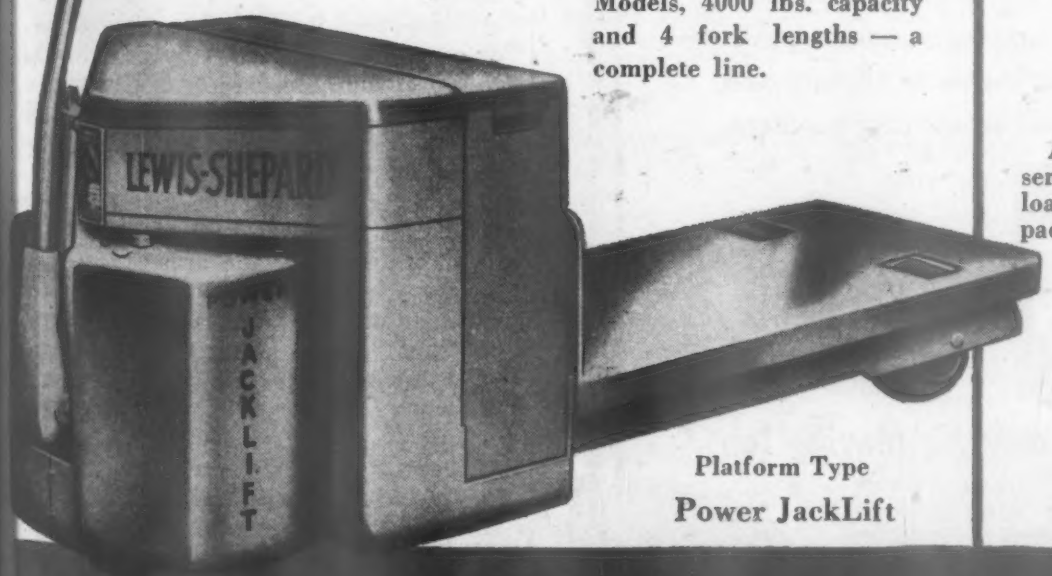
100% Electric
POWER JACKLIFT

This NEW L-S Power JackLift is 100% Electrically operated! Electric Drive, Electric Lift, Electric Brake each completely controlled with handle vertical and in all positions. The ability to operate truck with the handle in every position, provides the operator with a convenient handle-height, at any speed . . . gives him better control of truck at all times. . . . Allows him to maneuver in congested areas and in less floor space. Increases storage space!

100% Electric Operation

with Handle Vertical and in all positions.
100% Electric Drive —
100% Electric Lift —
100% Electric Brake

Models for Skid Platform handling in 4000 and 6000 lbs. capacity, 4-standard heights, 6 lengths, 2 widths. Pallet Models, 4000 lbs. capacity and 4 fork lengths — a complete line.



Platform Type
Power JackLift

L-S
FORK TRUCKS
"Pivot on a Platter"

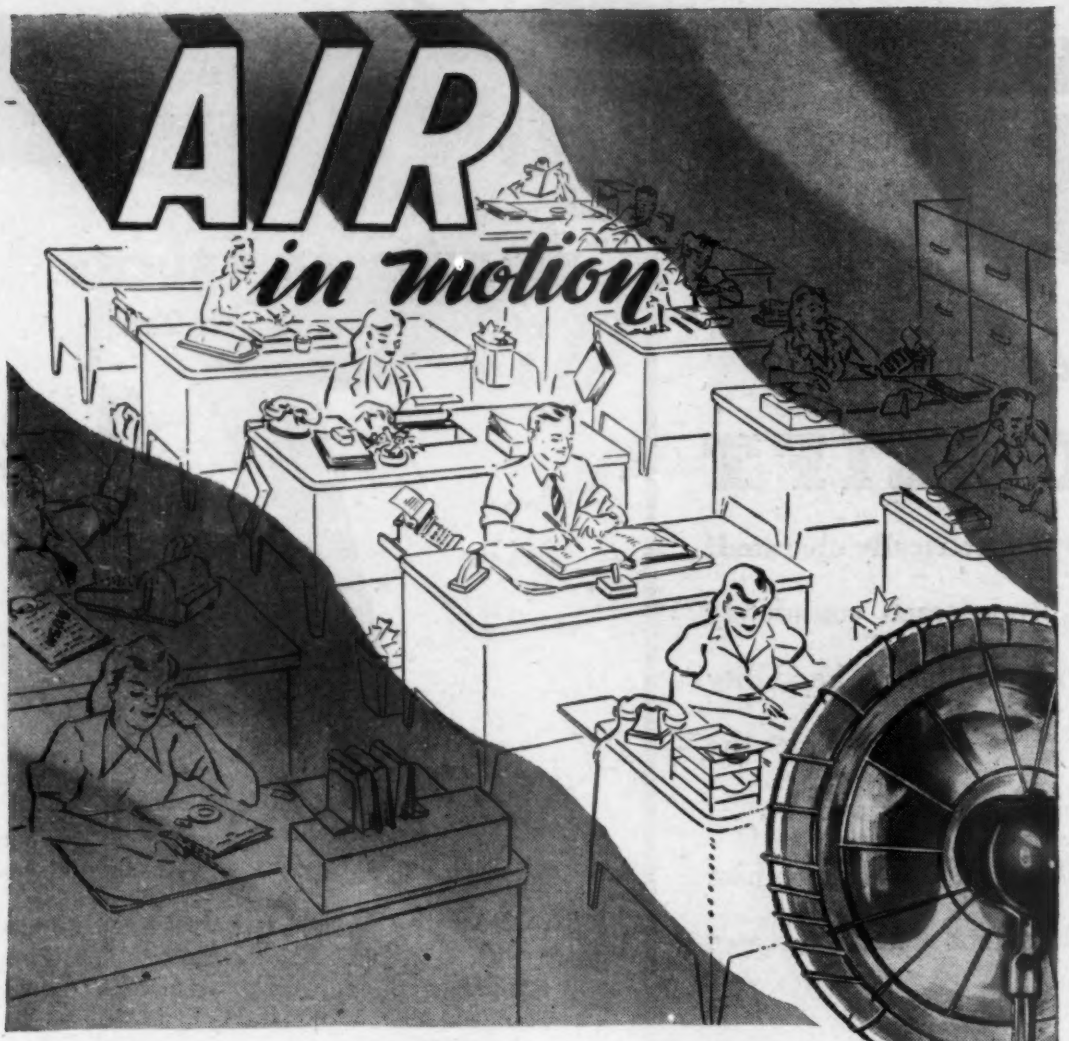
Save Time and Money, Increase your Storage Space with L-S Fork Trucks. Electric, Gasoline and Gas-Electric Models up to 4000 lbs. capacity. These rugged trucks operate in narrower aisles and right-angle pile in a single quarter turn.

L-S
Hand Operated
JACKLIFTS and HYDRAULICS

An economical investment for long, efficient service. Light in weight and built to carry all loads. JackLifts, 3" lift in 2500 to 5000 lbs. capacity. Hydraulics in both HandLift and Foot-Lift Models, 3500 to 15,000 lbs. capacity with 4" lift or higher.

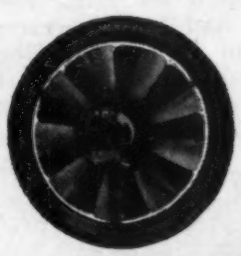
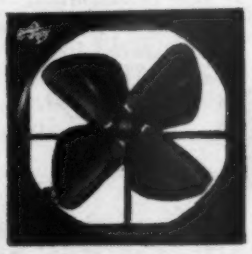
MULTIPLY MANPOWER · LEWIS-SHEPARD

LEWIS-SHEPARD PRODUCTS INC.
300 WALNUT ST., WATERTOWN 72, MASS.
REPRESENTATIVES IN PRINCIPAL CITIES — CONSULT YOUR PHONE DIRECTORY
SINGLELIFTS · HYDRAULIC HANDLIFT TRUCKS · JACKLIFTS · SKID & FLOOR TRUCKS · PALLET TRUCKS · STACKERS · PALLET STACKERS
PRODUCTION LOADERS · CRANES · BASKET · ELECTRIC, GAS-ELECTRIC AND GASOLINE POWERED FORK TRUCKS · POWER JACKLIFTS



...keeps MEN in action!

IF *let-down fatigue* hits your office or factory, ahead of quitting time, you should do something to stir things up! Start with the stagnant, muggy air that engulfs your workers like a heavy blanket. Keep air in motion—to keep people in action—with Emerson-Electric Fans and Air Circulators. In many an office and factory these sturdy fans actually pay for themselves in increased efficiency and improved employe-relations. Ask your Emerson-Electric Dealer to suggest the most efficient and economical equipment for your particular air-moving problem.

An EMERSON-ELECTRIC FAN for Every Air Moving Job

If yours is a business where greater comfort for customers, visitors or workers will help business, there's an Emerson-Electric Fan to do the job—direct-drive exhaust fans in five sizes from 12″ to 30″—heavy-duty belt-drive exhaust fans in 48″, 42″, 36″ and 24″ sizes—dependable desk fans with 10″, 12″, 16″ blades—air circulators (large illustration) 24″ and 30″ sizes with 4 styles of mountings. Write for Folder No. 422

THE EMERSON ELECTRIC MANUFACTURING CO.
St. Louis 21, Mo.

EMERSON ELECTRIC
MOTORS · FANS APPLIANCES

business. When he can expand, he needs more of us, and we are an ambitious bunch."

The advertisements pointed out that AFL employees in Minnesota helped turn out $2,000,000,000 worth of raw materials without any stoppage of work. They added, on the authority of an Eastern engineering firm, that the Minnesota manufacturer's labor cost in 1944 was 7.5 per cent less than his Eastern competitor's.

One result of the series, other than favorable comment, is negotiations with firms interested in starting operations in Minnesota.

The advertisements also won honorable mention among the advertising awards presented by the magazine *Advertising & Selling*.

SENIORITY RIGHTS ASSURED FOR PUBLIC EMPLOYEES

A San Francisco Civil Service Commission ruling recently provided that city employees whose services are made surplus by labor-saving machinery would not lose their jobs. The commission agreed that, as a matter of policy, pay rates and seniority of employees affected in such cases will be preserved and that surplus employees will be transferred to other positions.

INDUSTRIAL RELATIONS FOR A WHOLE COMMUNITY

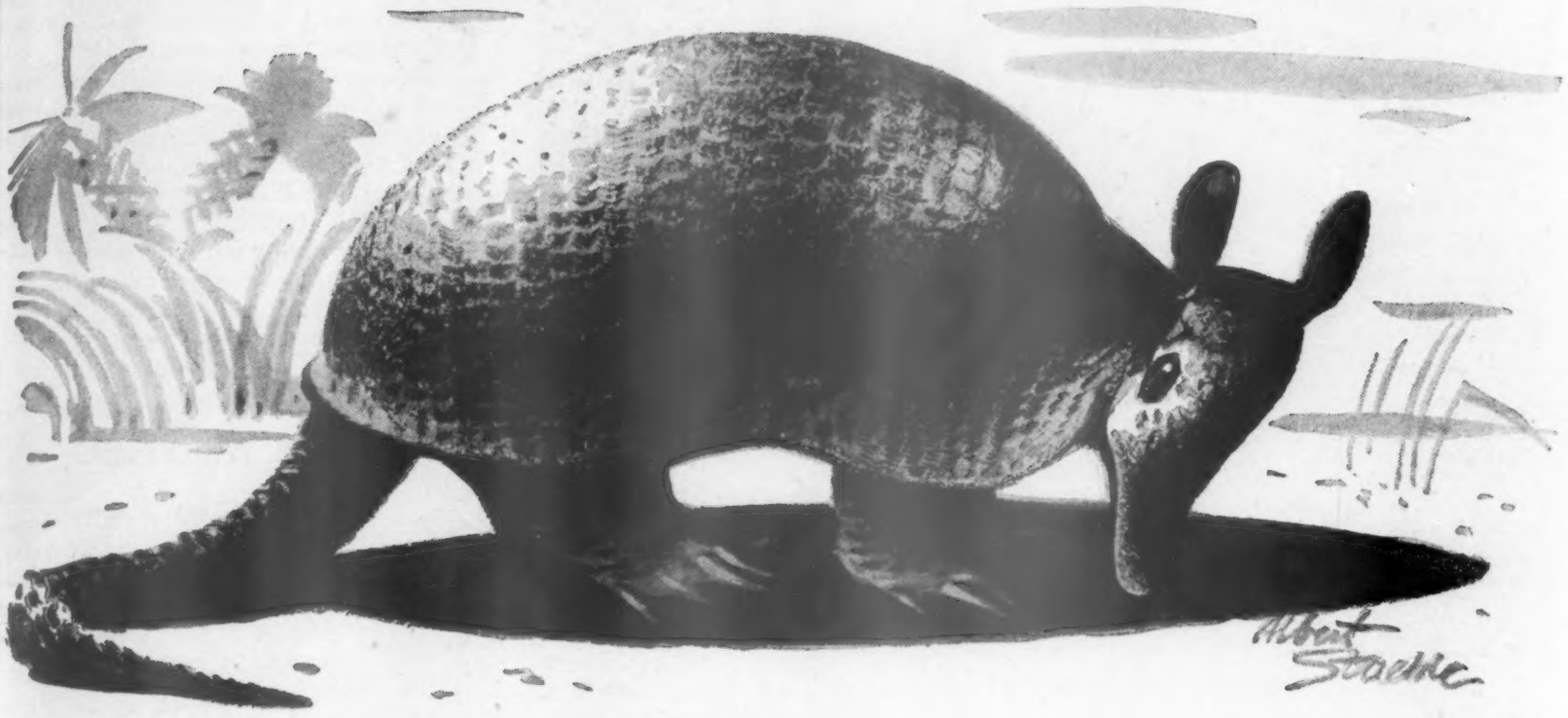
Improving industrial relations on a community-wide level is the task of a group of specialists in New Orleans, who render to manufacturers, wholesalers, retailers, and employers of every description a variety of services ranging from interpretations of federal labor laws to active assistance in drawing up personal procedures—and do it without charge.

These specialists comprise the employer-employee relations division of the New Orleans Association of Commerce. They are hired to help employers, both members and non-members of the Association, build better industrial relations. On more than one occasion, their advice has been an important factor in keeping factories and other places of business humming smoothly. Crescent City employers have better employee plans, offer better working conditions, have less industrial dissension, thanks to the work of this employer-employee division.

Keeping up on all current NLRB rulings and labor legislation, both federal and state, occupies much of the time of the division. It issues regular bulletins to its members explaining the legal aspects of labor practices (these bulletins are available for the asking to non-members) and maintains an ever-growing library of labor relations laws. The library is kept at the Association of Commerce offices, where personal managers, other management men, and even union chiefs consult it daily.

The office is prepared also to recommend training procedures and help put

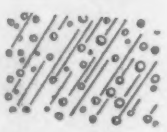
What keeps the armadillo dry can keep you "roof happy," too!



Over 90 years of successful roofing experience has demonstrated the sound value of the gravel or slag wearing surface of a Barrett Specification Roof:

1. It holds in place the heavy-poured (not mopped) top coat of coal-tar pitch—providing a doubly thick waterproof covering.

2. It provides protection against the sun's actinic rays which otherwise dry out the valuable oils in roofing bitumens.



3. It protects the roof against mechanical damage, hail and wind, wear and tear.

4. It interposes a surface of fireproof rock between the building and flying embers—makes a roof that carries Fire Underwriters' Class A Rating.

No roofing problem bothers the Armadillo. Inside his *armored wearing surface* he's safely protected from his natural enemies.

The Barrett Specification* Roof, with its armored wearing surface of gravel or slag, provides comparable protection for building structures. It's so tough and long-wearing it can be bonded against repairs and maintenance expense for as long as 20 years.

Built up of alternate layers of coal-tar pitch and felt, topped by a thick *pouring* of pitch to *anchor* the gravel or slag wearing surface, it is the toughest, longest-lasting built-up roof made. It is waterproof, fire-safe, sun-resistant, and *armored* against mechanical damage.

Why take chances with less than Barrett Specification Roof protection when it's so easy to be completely "roof happy." Consult the Barrett Approved Roofer nearest you, or write us.

THE BARRETT DIVISION
Allied Chemical & Dye Corporation
40 Rector Street, New York 6, N. Y.
2800 So. Sacramento Avenue — Birmingham
Chicago 23, Ill. — Alabama
In Canada: The Barrett Company, Ltd.,
5551 St. Hubert Street, Montreal, Canada
*Reg. U. S. Pat. Off.

Barrett Specification Roofs *

FM-5-47

I'D LIKE TO TALK ROOF WITH YOU

I want to know about the condition of the roofs on my buildings.
Send your Roof Inspector to see Mr. .....
Best time ..... A.M. ..... P.M. .....
Name .....
Address .....
City ..... State .....

New! LIGHTWEIGHT PACKAGED MATERIAL CONVEYOR

Tote-All PACKAGED MATERIAL ZEPHYR

FEATURES

- Length 10 ft.
- 10-in. belt.
- Special alloy steel—corrosion and abrasion resistant.
- Weighs only 291 lbs. (complete with power unit and undercarriage)
- Power unit—electric motor coupled direct to gear reducer.
- Rear wheels, solid—front, swivel caster
- Either end of 10-ft. model may be raised to 6-ft. height.

Handles, boxes, cartons, crates, bags . . . easily carries 40 lbs. to the foot distributed load. Use this husky, portable conveyor for unloading cars and trucks, stacking materials in warehouses and as a power booster for gravity conveyors. Operates from ordinary lighting circuit. Does the work of several men in a fraction of the time . . . helps you meet today's rising labor costs and shrinking labor market. Get full details on this new Tote-All Packaged Material Zephyr today—write for Bulletin FM.

A product of MATERIAL MOVEMENT INDUSTRIES
310 S. Michigan Ave.
Chicago 4, Ill.

material movement industries
. . . for lowest cost material handling

JOHNSON XLO MUSIC SPRING WIRE is a leader in the manufacturing field for quality and quantity production of springs. It is available for repair and maintenance . . . in handy packages . . . ¼ lb., ½ lb., and 1 lb. units . . . in full range of sizes from .003" to .200" dia. Every manufacturing plant needs it. Keep on hand a complete line to meet any emergency. Your mill supply house has stock now available.

If your distributor does not have Johnson Wire consult our nearest office.

JOHNSON
STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.
NEW YORK DETROIT AKRON CHICAGO LOS ANGELES TORONTO

employers in touch with firms from which they may obtain training material and visual aids. Sometimes it is able to furnish the required training material from its own large files of industrial education information. Occasionally a training curriculum has been blueprinted from scratch.

Personnel managers interested in laying out plans for bonuses or blanket increases to help their employees beat the rising cost of living, call on the office for assistance. Its files of living costs, correlated with the employers' files of wages, make planning simple.

Other services include aid in planning employee handbooks, preparing house organs, and developing company good will among employees with special procedures and ideas custom-tailored to individual conditions. One of the less spectacular but highly important services is help in writing union contracts.

BEHIND THE BYLINE

Facts About FACTORY'S Authors

Frederick M. Bock (page 73) is a graduate of the University of Darmstadt, Germany. He has been chief engineer and works manager of General Electric Company in Berlin, as well as technical advisor for the same company in its Buenos Aires office. For the past twelve years he has been connected with leading corporations in this country in a plant supervisory capacity. He was a member of a special commission investigating the industry of France, Belgium, Austria, and Germany after V-E Day. As assistant works manager of the Weatherhead Company, he designed the conveyor system he describes in his article.

W. L. Johnson (page 77) brings a wide background of experience to his personnel and industrial relations work at Bell & Howell Company. A graduate of Wooster College, he took graduate work in economics and law at the University of Chicago; then taught political science and economics for two years at Maryville College. He served in the first world war as an infantry captain. After years of sales work with major companies, he entered the newspaper field and for 18 years published three community papers

ANNOUNCING

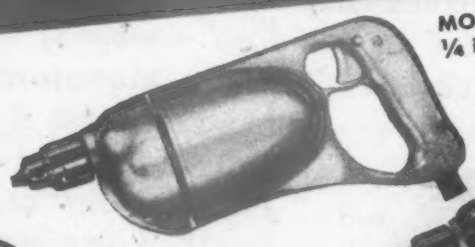
7 NEW SKILDRILLS . . .

7 NEW GOOD REASONS TO

SKILDRILL IT!

MODEL 241
¼ in. Standard

MODEL 242
¼ in. Special

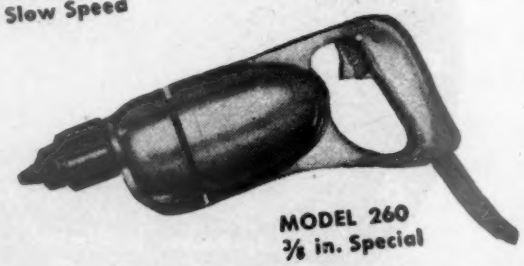


MODEL 243
¼ in. Heavy Duty

MODEL 244
¼ in. Slow Speed

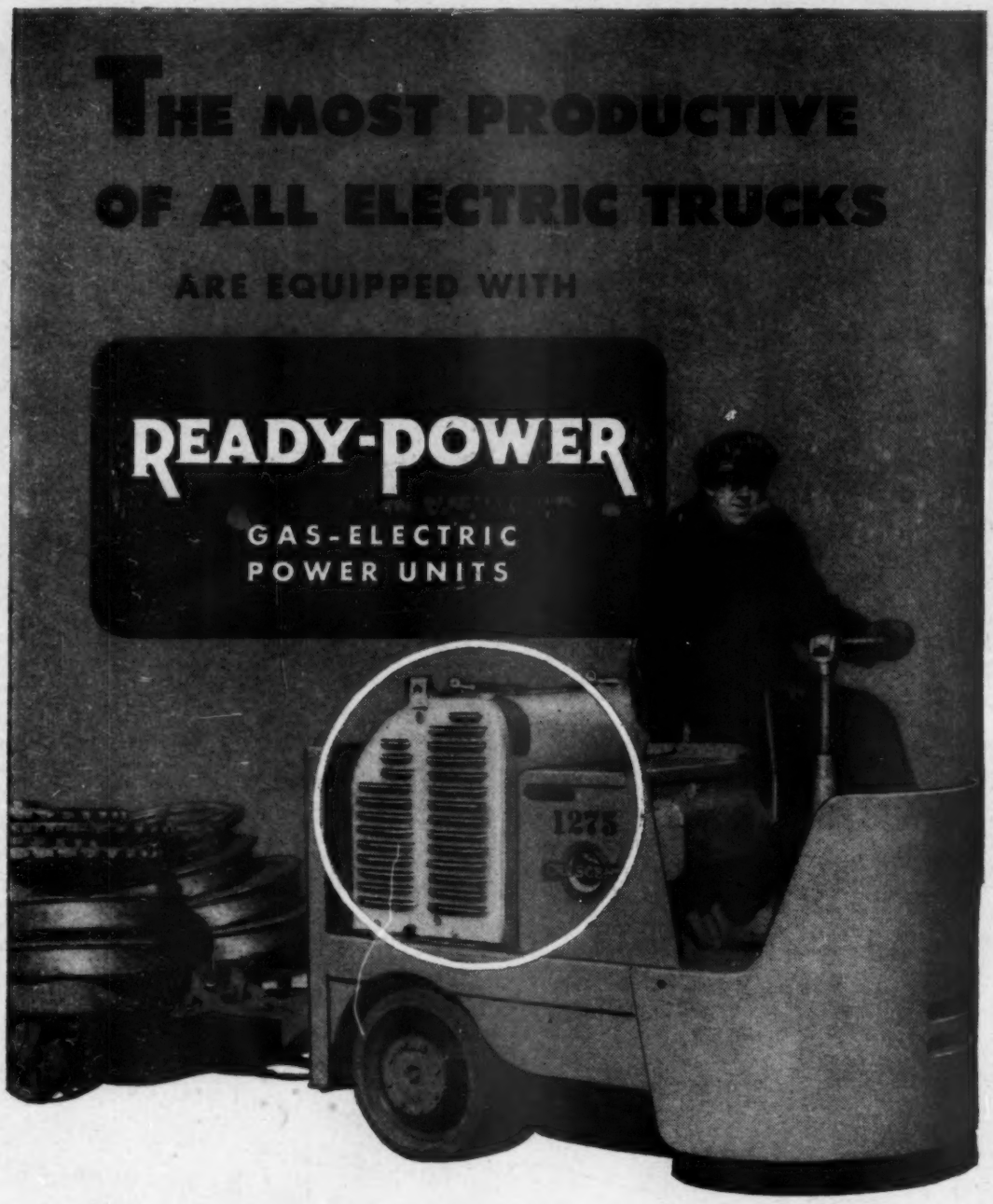
MODEL 250
5/16 in. Special

MODEL 253
5/16 in. Heavy Duty



MODEL 260
⅜ in. Special

SKILTOOLS



Electric trucks equipped with Ready-Power Units are industry's most effective materials-handling combination. The reason is simple. Because Ready-Power generates a continuous supply of dependable, live power right on the truck chassis, it permits *full speed* electric operation for an *unlimited number of hours.* Users report as much as 25% to 50% more tonnage handled with lower net costs. Ready-Power Units can be installed on any make truck. There are sizes for all jobs. Convert your present trucks to Ready-Power. Specify Ready-Power on new truck purchases.

THE READY-POWER CO.

3820 Grand River Ave., Detroit 8, Michigan

in Chicago. He is a member of the Industrial Relations Association of Chicago, and the National Association of Personnel Directors.

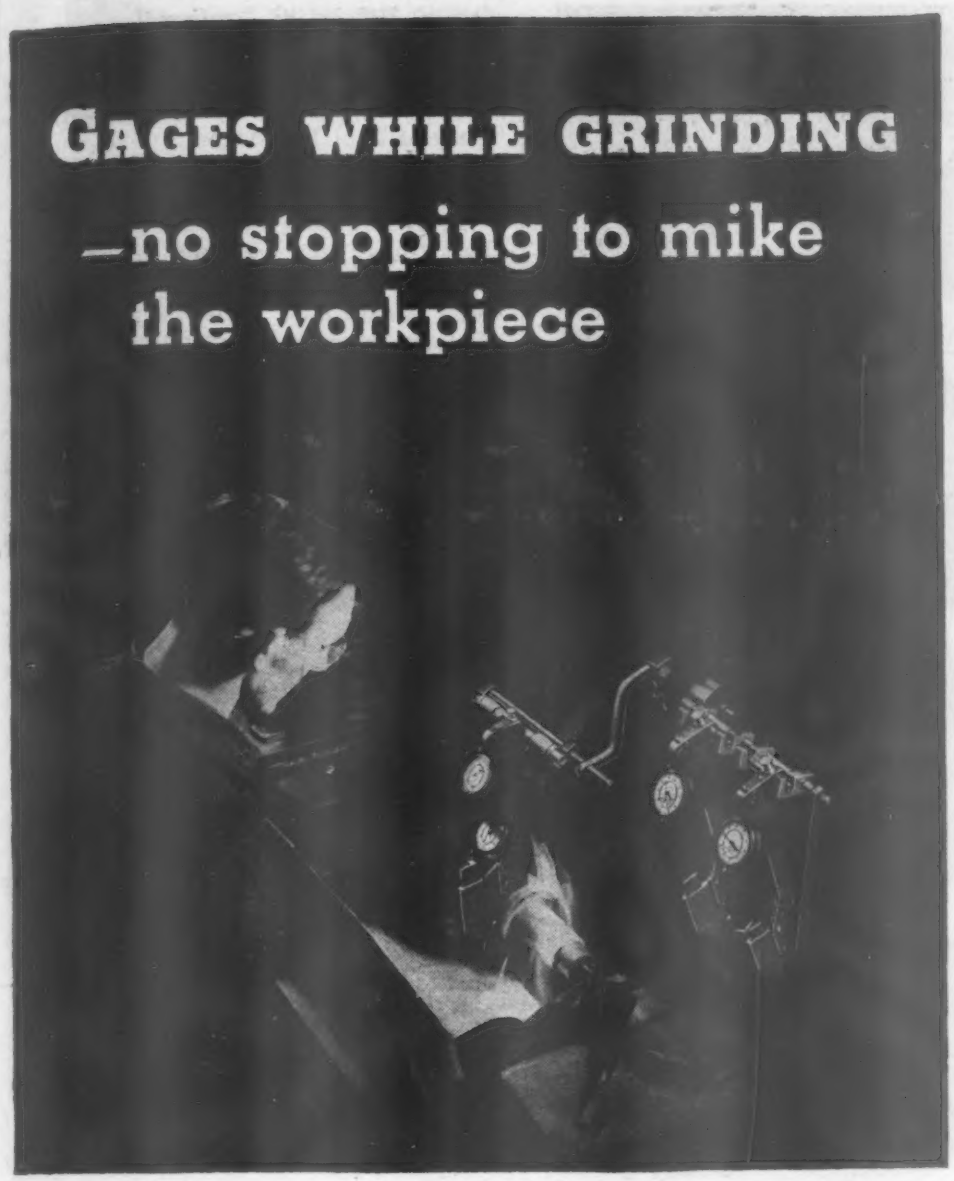
A University of Illinois graduate, Harry L. Husson (page 80) served with the Army Signal Corps, 163rd Aero Squadron from 1917 to 1919. His Bell System career began in 1923, when he was employed as a research engineer at the Western Electric Company's Hawthorne Works. In 1926 he was transferred to the Kearny Works, where he has served successively as superintendent of factory planning, manufacturing, and works service. He has received widespread recognition for special studies in the field of education, including a study of population trends. He holds patents on several products and processes of his own invention.

H. M. Bradley (page 90) has been a frequent contributor of articles to FACTORY. A native of Fall River, he learned the patternmaking trade there; then traveled and worked in industrial plants throughout the United States. Returning to his hometown, he became assistant master mechanic of the Fall River Iron Works. Since 1931, he has been employed by Manning, Maxwell & Moore, Inc., at the Bridgeport plant, where he is now plant engineer.

Richard H. Scobell (page 102) studied civil engineering at the University of Michigan mechanical engineering at Case, and accounting and electrical engineering at the University of Cincinnati. For 12 years he was employed in the Tabulating Machine Division of Remington Rand, Inc., where he worked on the special assignment of developing "central records." He is now works manager at Guardian Electric Manufacturing Company. His interest in special projects continuing, he has developed and installed a system for making the "foreman manager of his job." He is a

GAGES WHILE GRINDING

—no stopping to mike the workpiece



Increases production as much as 100%

Gage rides on the work throughout the grinding operation.

Gage lifted out of way while work is placed or removed from machine.

Prevents oversize regrinds and undersize rejects

WHEN your grinding machine is never stopped to check the size of the work in process, your hourly output increases . . . the cost per piece decreases. *That happens when you install a Federal-Arnold Continuous Grinding Gage.*

This gage controls dimensions at the machine *while the work is being ground.* You put the gage on the rotating workpiece and leave it there; you do not hold it on the work; there is no stopping to mike or gage for size.

The operator requires no unusual skill or training; he merely watches the Dial Indicator until the piece is finished. When the Dial Indicator says the work is to size, *it is to size.*

Attach an Arnold Gage to a grinder and you see immediate results. You eliminate oversize regrinds and undersize rejects . . . save many a dollar otherwise lost in scrap. Even on short runs, this saving in scrap and the increase in output pay for your Arnold Gage in a very short while. Actual records show production increases as high as 116%.

This instrument is easily installed; is sturdily constructed to assure long life and continued accuracy. The contact points are made of tungsten carbide.

You can use Arnold Gages to check straight, tapered or splined diameters; widths between or over shoulders; combined diameter and width. Let a Field Service Man show you the applications to your grinding operations. Write us for illustrated Bulletin No. 44.

FEDERAL

FEDERAL PRODUCTS CORPORATION
1144 Eddy St., Providence 1, R. I.

● **Dimensional Dial Indicators and Indicating Gages — mechanical, electronic, air, multi-dimensional · Automatic Sorting · Dimensional Machine Control · Combinations of these methods. For the Mechanical, Textile, Rubber, Paper and all industries requiring dimensional accuracy.**

CHOOSE THE RIGHT STEEL SHEET FOR YOUR PRODUCT!

● Careful selection of the *right* Continental sheet for each application, for each product improvement, will help you turn out products of higher quality, frequently at lower manufacturing cost. From the list of Continental sheets shown below you'll probably find the *right* one for your requirements.

KONIK SHEETS

Here is a new sheet made exclusively by Continental, which provides added strength, toughness and greater resistance to rust. Made to a patented analysis, KONIK combines quality open hearth steel with copper, nickel and chromium to produce one of the finest, most enduring and most economical steels you can buy. KONIK works readily, stands extreme forming operations, and machines well. Write for special, descriptive folder.

GALVANNEALED

For sheet steel products requiring paint or enamels, specify Continental GALVANNEALED. This highly rust-resistant zinc-coated sheet has a matte-like surface which "takes" and "holds" fine finishes without the need of costly preparatory treatments. Its high degree of workability saves time, encourages good workmanship.

DULL-COAT

Like GALVANNEALED, Continental's DULL-COAT sheet also has a good surface which provides a tight bond for paints, enamels, and lacquers. It works easily, and is uniform in quality.

COPPER STEEL

To put longer life into your products . . . to provide extra resistance to rust and corrosion, use Continental COPPER STEEL. This sheet is made of special analysis copper steel. It is uniform in temper . . . noted for its workability and long life.

GALVANIZED

Here is a ductile and bright spangled time-saving sheet which is ideal for many products. It is uniform for good workability. Its zinc-coating has an unusual ability to withstand forming operations without flaking or peeling.

ELECTRICAL

This sheet is made especially for electrical equipment manufacture. Its uniformity of temper makes it suitable for most requirements in this application.

CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO INDIANA

PRODUCERS OF STEEL SHEETS, including Continental GALVANIZED, COPPER-STEEL Galvanized, KONIK steel sheets Galvanized, UNIFORM SPANGLE Galvanized, DULL COAT, Continental GALVANNEALED, ELECTRICAL, Hot Rolled Pickled, and many styles of Formed Roofing. ALSO, Manufacturer's Wire in many sizes, shapes, tempers, and finishes, Continental Chain Link Fence, Nails, and other steel products.

member of the American Institute of Electrical Engineers and American Society of Tool Engineers.

A Byline biography for Richard D. Fell (page 104) appeared in the March issue of FACTORY on page 234. His business background includes positions as factory accountant, time study engineer, and cost accountant.

A previous contributor to FACTORY, Walter Hoffman (page 108) has had wide experience in subjects relating to industrial training. He has written several articles on various aspects of work simplification and has been a panel member and instructor at numerous conferences and training programs. His business career was reviewed in the June issue of FACTORY, page 296.

A graduate of Massachusetts Institute of Technology in 1913, Arthur L. Brown (page 111) remained at M.I.T. as an instructor in mechanical engineering subjects for four years. He then served as an officer in ordnance during the first world war. In 1921 he joined the Factory Mutual inspection department, assigned to laboratory and field investigations of fire protective equipment and special hazards. He is now assistant manager of the Factory Mutual Laboratories, with direct responsibility for fire protection and engineering standards. He is a director of the National Fire Protection Association, serves on the Council of the American Standards Association; is a member of the American Society of Mechanical Engineers, the American Society for Testing Materials, and the National Safety Council.

Julius B. Kaiser (page 244) first became interested in business records, their preservation, and periods of retention, when he was engaged in 1942 by a large microfilming concern to compile such information to assist salesmen in determining which of their clients' papers should be filmed. Presently engaged as archivist of Standard Brands, his active interest in this subject extends to all commercial records. He is currently compiling a book dealing with the length of time the main records of industry should be held.

CUT LIGHTING • CLEANING • HEATING COSTS WITH

PC GLASS BLOCKS

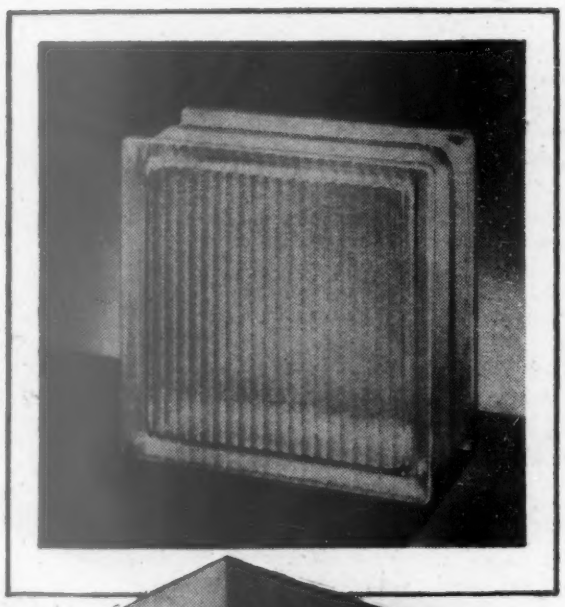
One way to combat rising production costs is to take full advantage of the economies inherent in the modern building material of countless uses, PC Glass Blocks.

Light—plenty of it—is directed to where it is needed most. So you save much of the money you would otherwise pay out for artificial light.

Panels of PC Glass Blocks are quickly and easily cleaned, inside and out. They prevent dust infiltration, rarely need repairs or replacement. So they save time and the cost of maintenance labor and supplies.

In addition, PC Glass Block panels have high insulating efficiency. So heat losses are materially reduced, thereby saving wear and tear on heating and air-conditioning equipment and saving many of the dollars you would otherwise spend for fuel.

These are some of the ways PC Glass Blocks pay for themselves over a period of years. Why not fill in and mail the convenient coupon for a free copy of our booklet, which contains *complete* information on this modern building material? Pittsburgh Corning Corporation, 632 Duquesne Way, Pittsburgh 22, Pennsylvania.



Also Makers of
PC Foamglas Insulation

PITTSBURGH PC CORNING
T. M. REG. U.S. PAT. OFF.

FOR ADDITIONAL INFORMATION SEE OUR INSERTS IN SWEET'S CATALOGS

GLASS BLOCKS

Distributed by PITTSBURGH PLATE GLASS COMPANY
by W. P. Fuller & Co. on the Pacific Coast and
by Hobbs Glass Ltd. in Canada

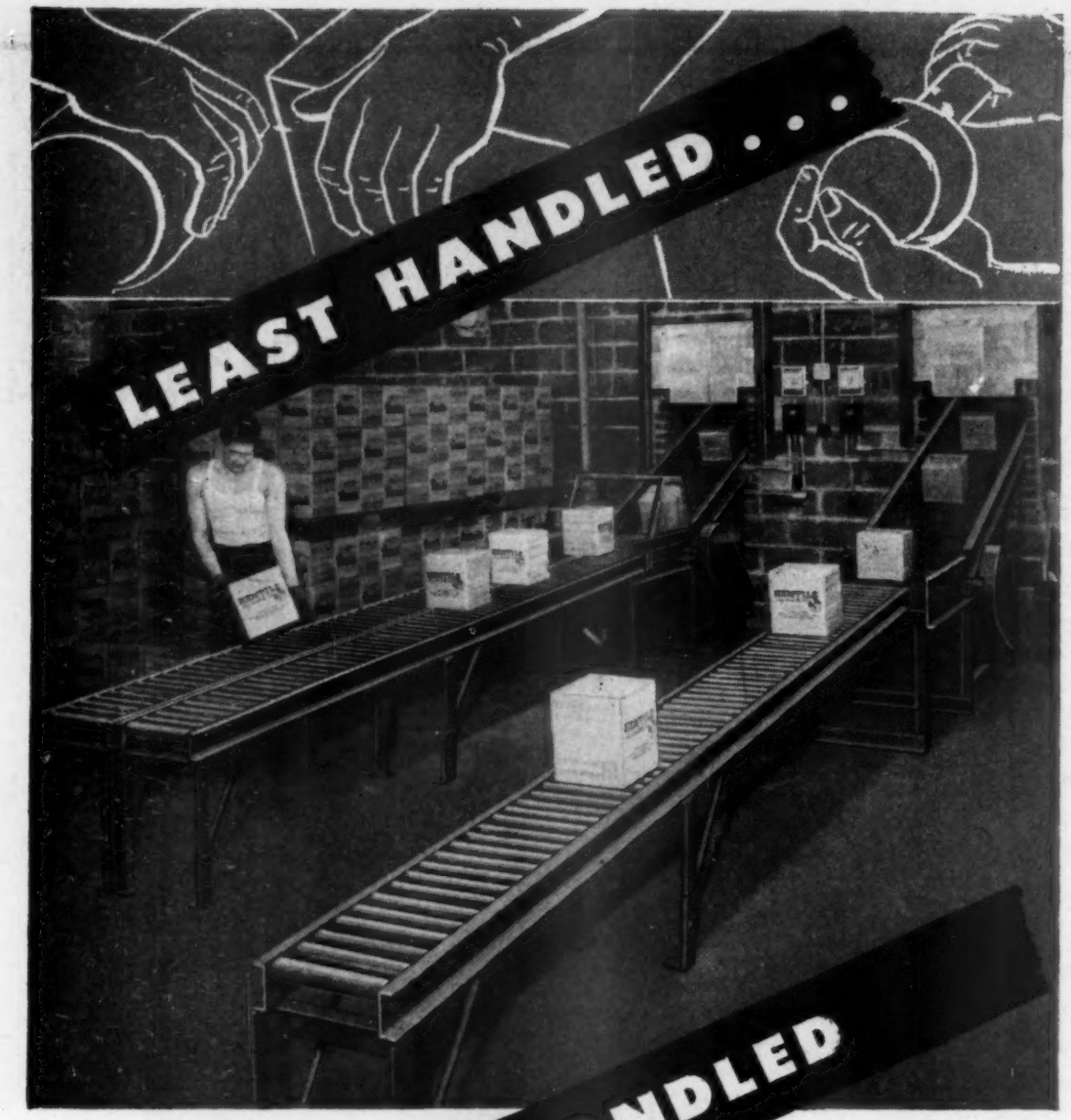
Pittsburgh Corning Corporation
Room 630, 632 Duquesne Way
Pittsburgh 22, Pa.

Please send along my free copy of your new book on the use of PC Glass Blocks for Industrial Buildings. It is understood that I incur no obligation.

Name_____

Address_____

City_____ State_____



Logan Belt Conveyors deliver cartons of asphalt tile to Logan Roller Lines in storage area. Cartons are placed on Belt Conveyors in packing room on floor above

How many times do you "pick it up—and lay it down?" That's what costs money, as your product moves through successive stages of manufacture, assembly, packing and shipping. Reduce the number of times it is touched by human hands and you cut your costs . . . permanently.

With Logan equipment "doing the moving," work can be performed enroute, without removal from the conveyor, in many instances. In all Logan installations, there is a definite reduction in expensive manual handling.

Doing it the Logan way is the user's guarantee of maximum savings in time, effort and space . . . and in employe satisfaction too.

Logan Conveyors

LOGAN CO., INC., 510 CABEL ST., LOUISVILLE 6, KENTUCKY

HOW LONG TO HANG ONTO RECORDS

JULIUS B. KAISER, Archivist, Standard Brands, Inc., New York

The accumulation of records can—and often does—create a severe storage problem. To correct this, more attention should be given the length of time records are kept, because scientific controls can be used to regulate their retention. Such controls are (1) record evaluation and (2) the use of formulas to determine the retention period for duplicate and overlapping forms.

Space, today, is at a premium. Office workers' salaries are high. The square feet allocated to "the files" or to a pell-mell assemblage of records not only runs into money, but also cuts down footage available for profitable manufacturing. Maintenance costs for these "pieces of paper" are sheer expense.

A manufacturing concern embarking on a record retention and destruction program must sail a true course between two strong currents, either of which may be disastrous. The desire to swing one way, to "throw it all away—we need the room," results in the loss prematurely of records that may be an invaluable source of information to present and future management, offering a picture of past mistakes to be avoided or past successes to be repeated. The other current—pulling in the opposite direction and stated usually, "better keep it all. No telling when we'll need it"—results in holding outdated, worthless papers to the point where they become too disorderly to use.

In both these extremes lie expenses. The first contains the serious losses which ignorance of the past makes inevitable; the second involves maintenance and space dedicated to rubbish.

Evaluating Records

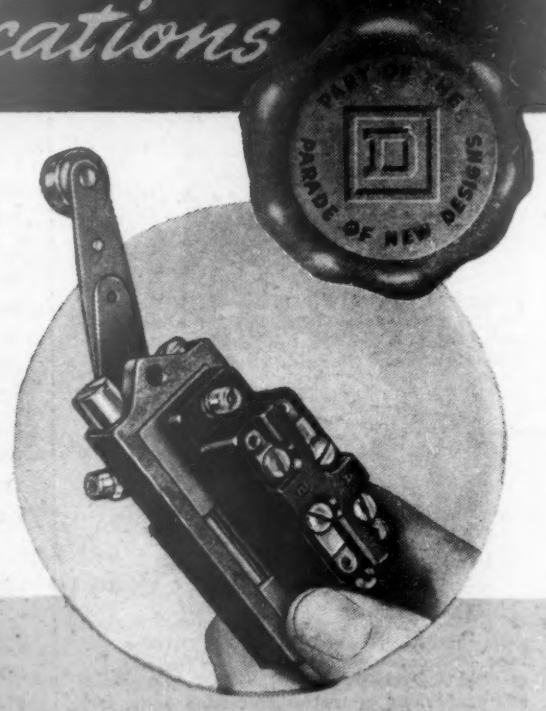
Record evaluation is the basis of any intelligent system of paper preservation. This compares with the quality inspection given to the "intentional" product, and the need for this test is equally urgent. Values assigned to records (the "incidental" product) as the result of investigation should be expressed in years of retention.

To judge a record's worth correctly, one must be guided by the paper's function—not by its name.

Also, to foretell effectively the expiration date of a record's worth requires study of organization set-up. Perhaps the record is in two or more copies—with one or more divisions of the company holding a copy. In such instances, especially when the main purpose of the paper is to inform a department that holds a copy—such as the accounting department's copy of shipments from the factory—the manufacturing department's need of its copy is restricted to a year, merely to use as a check against possible errors.

If records can be made in manifold copies, it is likewise possible to create a synthetic record out of others. This

Square D's *Precision Snap Switch* in oil-tight limit switch enclosures *for Machine Tool Applications*



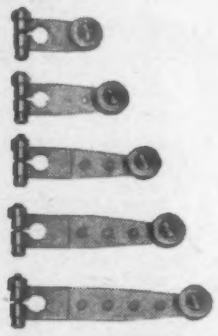
At left—Surface mounted, lever operated Class 9007, Type AW-12 limit switch.

Above—Cover of limit switch removed to show mounting of precision snap switch and four terminal posts.

TYPE AF-22 • Flush Mounting • Push-Rod Operated.

TYPE AF-12 • Flush Mounting • Lever Operated.

TYPE AW-22 • Surface Mounting • Push-Rod Operated.

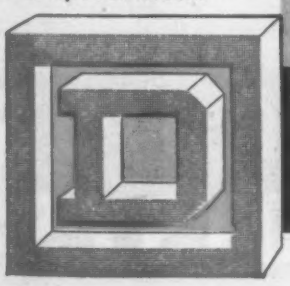


OPERATING ARMS • Available with ⅝" to ¼" Standard Roller or Special Rollers.

The New Limit Switch is a "natural" for machine tool applications. Completely oil-tight, gasketed, die-cast enclosure • Mechanism requires only 5° travel to trip and provides 25° overtravel • Operating arms adjustable to any position around a circle and available in five lengths • One-way and other special rollers available • Return springs easily reversed for either clockwise or counter-clockwise lever operation or removed for maintained contact action • Surface and flush mounting arrangements with either roller arm or push rod operated mechanisms meet virtually any mounting and application requirement • Box of surface mounted arrangement can be rotated to provide conduit entrance at either end of switch.

The Precision Snap Switch operating mechanism consisting of only two alloy leaf springs has no dead center position and gives exceptionally long life • Stainless steel compression return spring insures positive operation and reliable service • Husky highly arc resistant melamine case • Heavy contact blade separate from operating mechanism • Terminals, suitable for No. 14 wire • Separate normally open and normally closed circuits have double break silver contacts.

Write Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin.
Or ask your nearby Square D Field Engineer to show you a sample.



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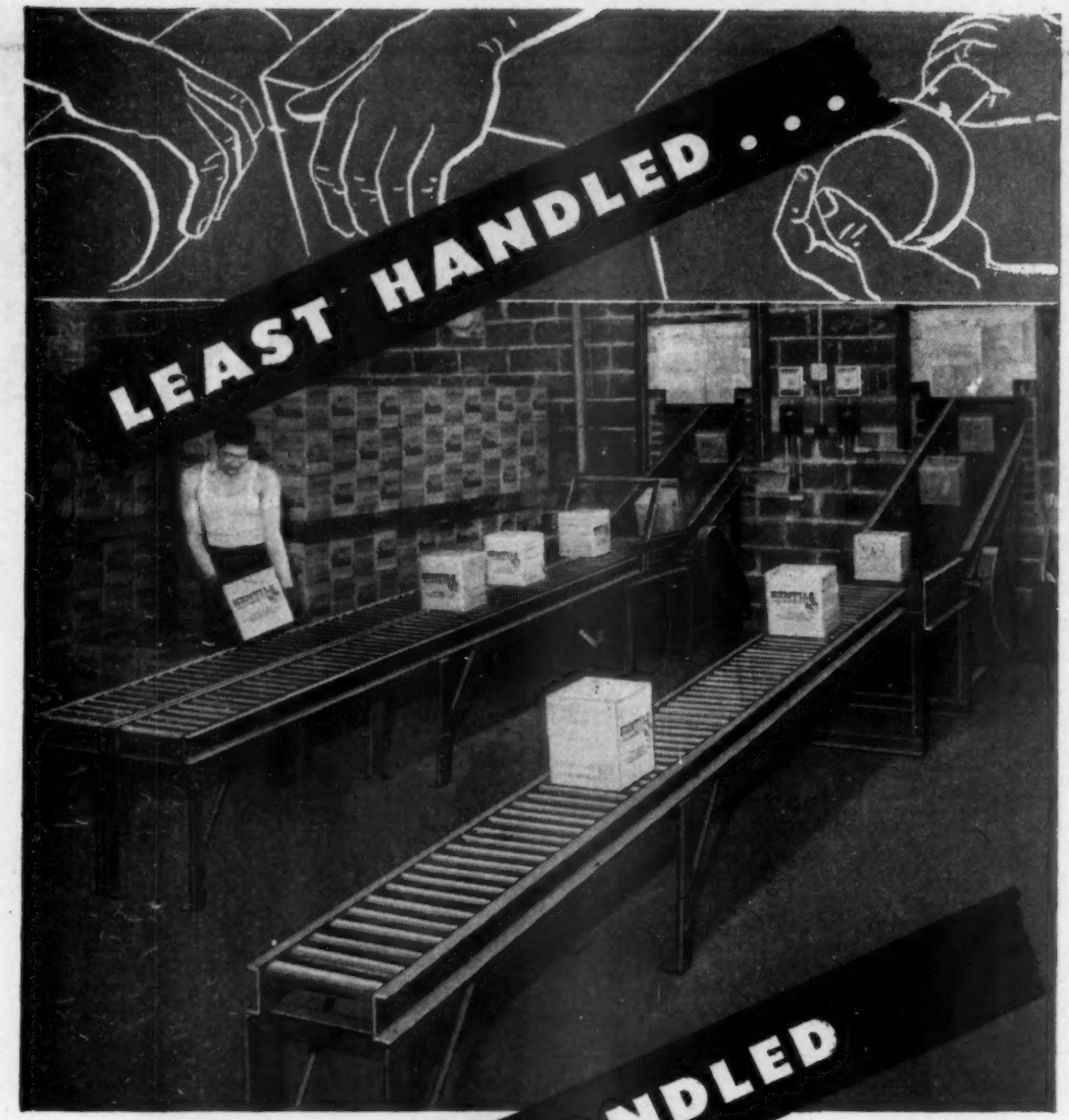


Logan Belt Conveyors deliver cartons of asphalt tile to Logan Roller Lines in storage area. Cartons are placed on Belt Conveyors in packing room on floor above

How many times do you "pick it up—and lay it down?" That's what costs money, as your product moves through successive stages of manufacture, assembly, packing and shipping. Reduce the number of times it is touched by human hands and you cut your costs . . . permanently.

With Logan equipment "doing the moving," work can be performed enroute, without removal from the conveyor, in many instances. In all Logan installations, there is a definite reduction in expensive manual handling.

Doing it the Logan way is the user's guarantee of maximum savings in time, effort and space . . . and in employe satisfaction too.

Logan Conveyors

LOGAN CO., INC., 510 CABEL ST., LOUISVILLE 6, KENTUCKY

HOW LONG TO HANG ONTO RECORDS

JULIUS B. KAISER, Archivist, Standard Brands, Inc., New York

The accumulation of records can—and often does—create a severe storage problem. To correct this, more attention should be given the length of time records are kept, because scientific controls can be used to regulate their retention. Such controls are (1) record evaluation and (2) the use of formulas to determine the retention period for duplicate and overlapping forms.

Space, today, is at a premium. Office workers' salaries are high. The square feet allocated to "the files" or to a pell-mell assemblage of records not only runs into money, but also cuts down footage available for profitable manufacturing. Maintenance costs for these "pieces of paper" are sheer expense.

A manufacturing concern embarking on a record retention and destruction program must sail a true course between two strong currents, either of which may be disastrous. The desire to swing one way, to "throw it all away—we need the room," results in the loss prematurely of records that may be an invaluable source of information to present and future management, offering a picture of past mistakes to be avoided or past successes to be repeated. The other current—pulling in the opposite direction and stated usually, "better keep it all. No telling when we'll need it"—results in holding outdated, worthless papers to the point where they become too disorderly to use.

In both these extremes lie expenses. The first contains the serious losses which ignorance of the past makes inevitable; the second involves maintenance and space dedicated to rubbish.

Evaluating Records

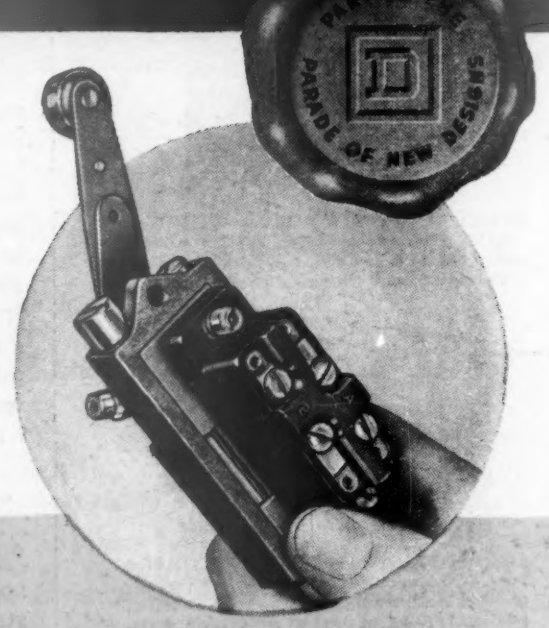
Record evaluation is the basis of any intelligent system of paper preservation. This compares with the quality inspection given to the "intentional" product, and the need for this test is equally urgent. Values assigned to records (the "incidental" product) as the result of investigation should be expressed in years of retention.

To judge a record's worth correctly, one must be guided by the paper's function—not by its name.

Also, to foretell effectively the expiration date of a record's worth requires study of organization set-up. Perhaps the record is in two or more copies—with one or more divisions of the company holding a copy. In such instances, especially when the main purpose of the paper is to inform a department that holds a copy—such as the accounting department's copy of shipments from the factory—the manufacturing department's need of its copy is restricted to a year, merely to use as a check against possible errors.

If records can be made in manifold copies, it is likewise possible to create a synthetic record out of others. This

Square D's *Precision Snap Switch* in oil-tight limit switch enclosures *for Machine Tool Applications*



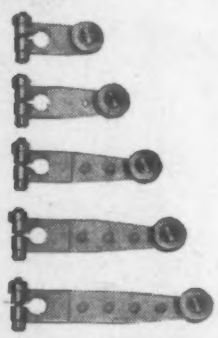
At left—Surface mounted, lever operated Class 9007, Type AW-12 limit switch.

Above—Cover of limit switch removed to show mounting of precision snap switch and four terminal posts.

TYPE AF-22 • Flush Mounting • Push-Rod Operated.

TYPE AF-12 • Flush Mounting • Lever Operated.

TYPE AW-22 • Surface Mounting • Push-Rod Operated.



OPERATING ARMS • Available with 5/8" to 1/4" Standard Roller or Special Rollers.

The New Limit Switch is a "natural" for machine tool applications. Completely oil-tight, gasketed, die-cast enclosure • Mechanism requires only 5° travel to trip and provides 25° overtravel • Operating arms adjustable to any position around a circle and available in five lengths • One-way and other special rollers available • Return springs easily reversed for either clockwise or counter-clockwise lever operation or removed for maintained contact action • Surface and flush mounting arrangements with either roller arm or push rod operated mechanisms meet virtually any mounting and application requirement • Box of surface mounted arrangement can be rotated to provide conduit entrance at either end of switch.

The Precision Snap Switch operating mechanism consisting of only two alloy leaf springs has no dead center position and gives exceptionally long life • Stainless steel compression return spring insures positive operation and reliable service • Husky highly arc resistant melamine case • Heavy contact blade separate from operating mechanism • Terminals, suitable for No. 14 wire • Separate normally open and normally closed circuits have double break silver contacts.

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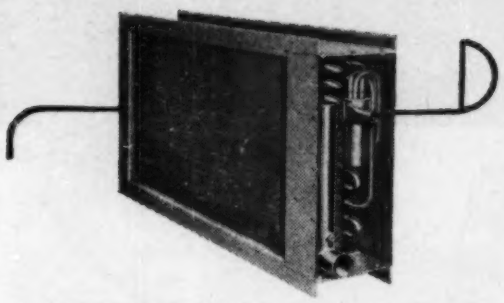
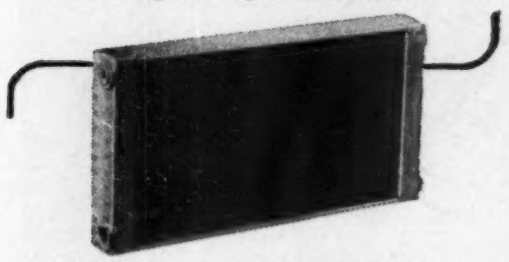
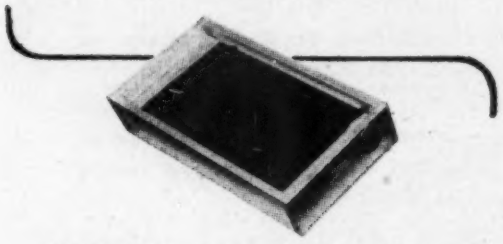
AND AIR CONDITIONING UNITS



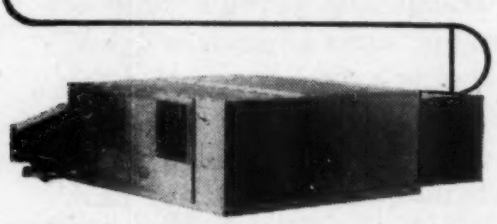
EVAPORATOR COILS • Illustrated is Type "E," for direct expansion cooling systems using Freon or methyl chloride. Complete with casing and liquid distributor.



COMMERCIAL HEAT TRANSFER COILS • Type "C" (unencased) comes in multiplicity of sizes for factory-built air conditioning, heating, drying or special processing units.



BLAST COILS • Type "B" shown here, is for use in central plant heating, ventilating and air conditioning systems. Has casing for bolting to sheet metal housings.



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process of "draining dry" the salient information of a group of records to form a single new one is known as completely transcribing the group.

A record that has "given its all" to produce another, comprehensive record, is valuable for only a year after its transcription, and its utility during that period is restricted to verification of the "master record."

But all the information may not be transcribed. If we consider a form showing idle machine hours, we see that the totals are generally the only factors transcribed for reports or for the use of accountants. Thus, these forms have been only partially transcribed.

A partially transcribed record contains a balance of information and possesses it exclusively. Such a record is worth keeping a year as a check against error in the transcribed portion. Its balance, the untranscribed portion of its contents, should be evaluated in terms of how long its data will have value, and a retention period should be fixed accordingly.

Setting Up Regulations

In calculating retention periods for specific papers, the best guide is the instructions of government bodies regulating public utilities. Utilities are told by tne Interstate Commerce Commission, through regulations, the length of the holding period for specific documents before destruction is allowed. These regulations may be obtained from the Government Printing Office in Washington, D. C. An analogy drawn between records mentioned in these booklets and the records customarily used by factories, gives an excellent source of facts on the subject of retention.

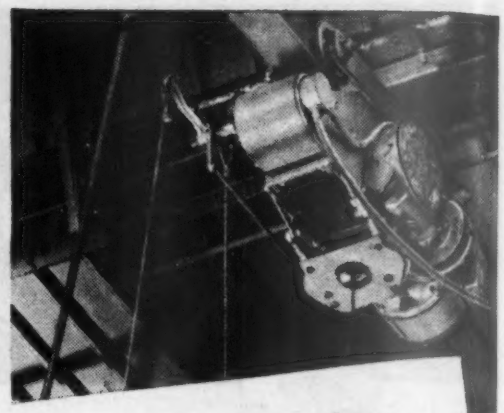
In addition, regulations on "How to Keep Wage and Hour Records" issued by the U. S. Department of Labor should be consulted when complexities arise in regard to records of employees' earnings.

From all sources, the following recommendations have been compiled. In using the suggested retentions, it would be wise to remember that names of records may vary and that *function* determines a paper's value. And, of course, transcribed records should have the special treatment previously discussed.

Among the records deserving permanent tenure are these:

Disclosures of inventions.
Blueprints and formulas.
Field control summaries.
Design changes.
Plant layout.
Production sequence.
Performance of equipment.
Property cards, showing changes.
Total production costs.
Costs, departmentally.
Changes in efficiency standards.
Unit cost summaries.
Adjustments from sale of scrap.
Work simplification data.
Accident prevention material and results.

CONTINUED ON PAGE 248



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Customers specifications.
Quality control charts.
Uses for the product.
Drawings of capital items.
Factory methods.
Instructions to operators.
Comparative equipment reports.
Costs records, capital account
Plant operation summaries.
Labor efficiency *versus* standards.
Labor turnover analyses.
Product control sheets.
Wage incentive plans.
Payroll summaries.
Year-end inventories.

Records worthy of 7-year tenure:
Expense analyses.
Expense distribution analyses.
Inventories—not year-end.
Labor distribution analyses.
Costs sheets not fully transcribed.
Union agreements (after expiration).

Individual employee's earning records, according to Wage and Hour rulings, should be retained 4 years. If dispute arises after that time (and it can and has happened) the payroll summary should be referred to without requirement of these "original, direct proof" records' presence in court. The absence of these papers cannot be construed as lack of evidence, for instructions of the governing body have been obeyed. A list of such records is given here:

Clock cards.
Employees' time tickets.
Earnings computations.
Additions to wages (overtime, etc.).
Job orders and time schedules.
Production count checks.
Deductions from wages.

Wage rate and piece rate tables, according to the same regulations, should be held for 2 years following expiration.

Records of the storekeeper, if not transcribed, should be kept 3 years. These records include:
Stock cards.
Quantity balance.
Requisitions on storeroom.
Tool inventories.
Material transfer orders.
Supplies received and dispensed.
Tool orders and assignments.
Stores credit forms.

The same rule applicable to the storekeeper's records applies to idle man and idle machine records, to sampling tests for quality control and inspection records.

Papers not deserving more than a year's tenure include:

Job schedules.
Stock tracing records.
Cards used for taking inventory.
"Late" job reports.
Progress of shop program.

Orderliness in the preservation of factory records pays off. Space is saved by the destruction of worthless papers. Maintenance costs are reduced proportionately. Best of all, the search for a badly needed document will be a great deal more successful if the bulk of nonessential records has been eliminated.

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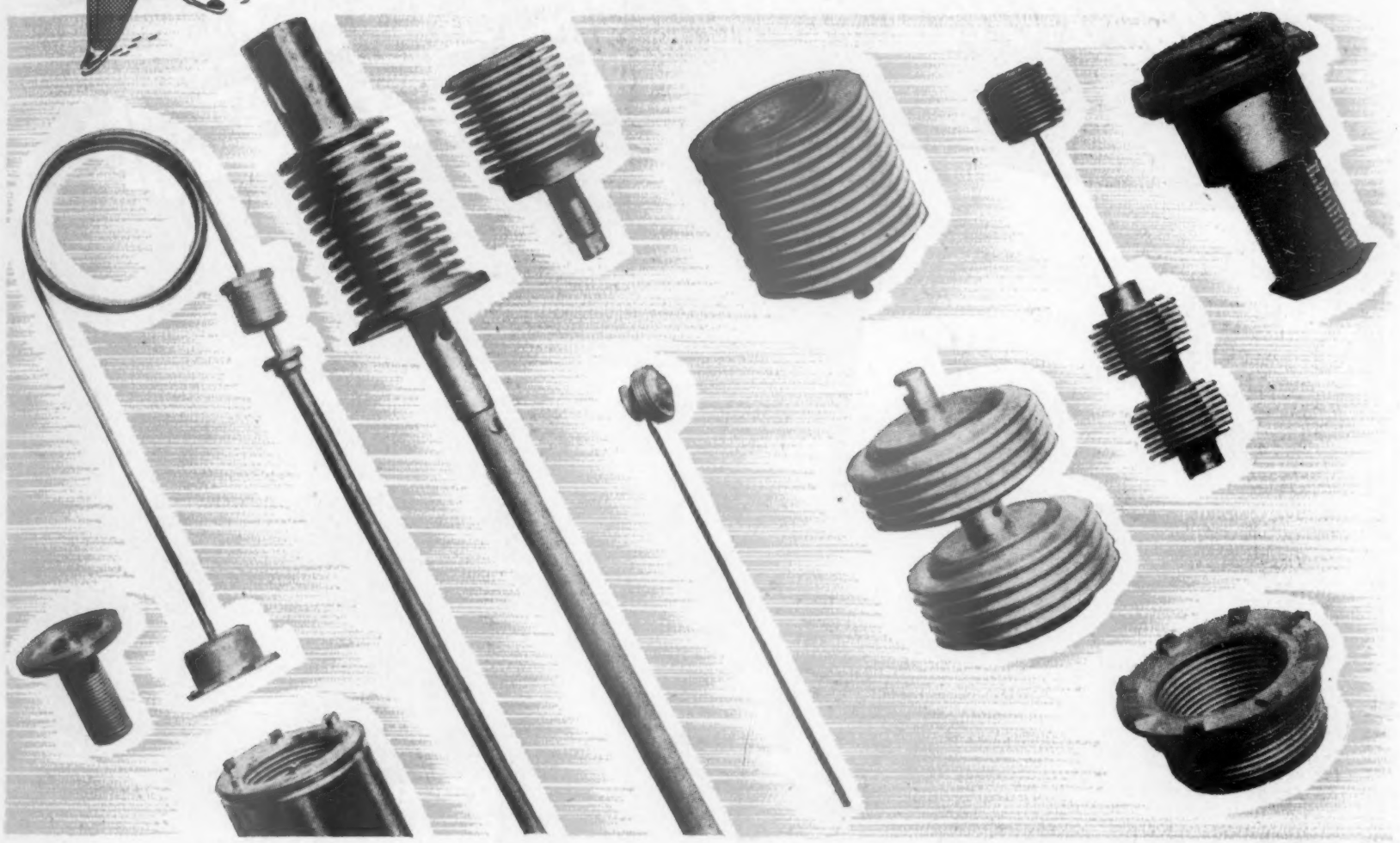

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Memo to R.S.:
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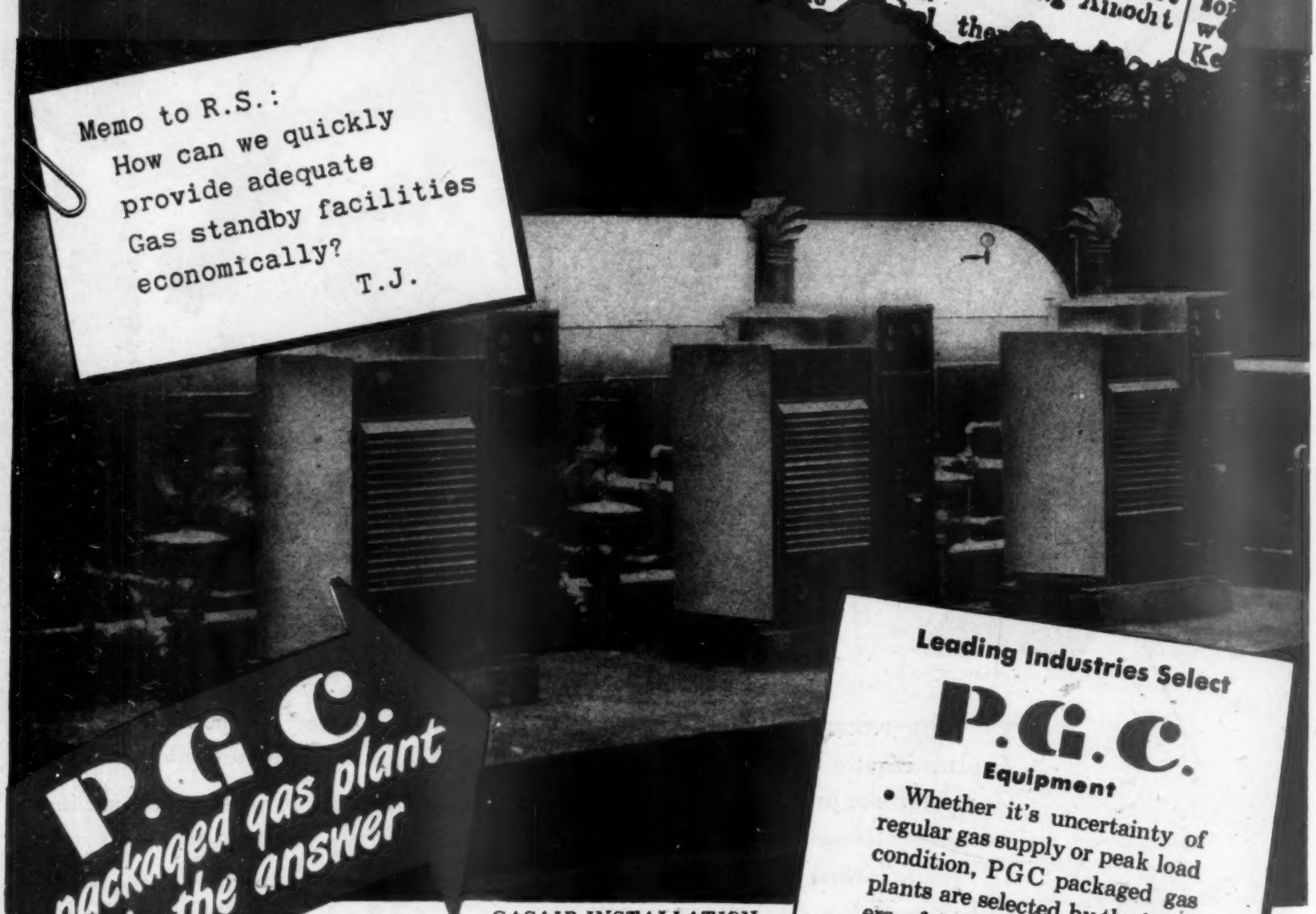
T.J.



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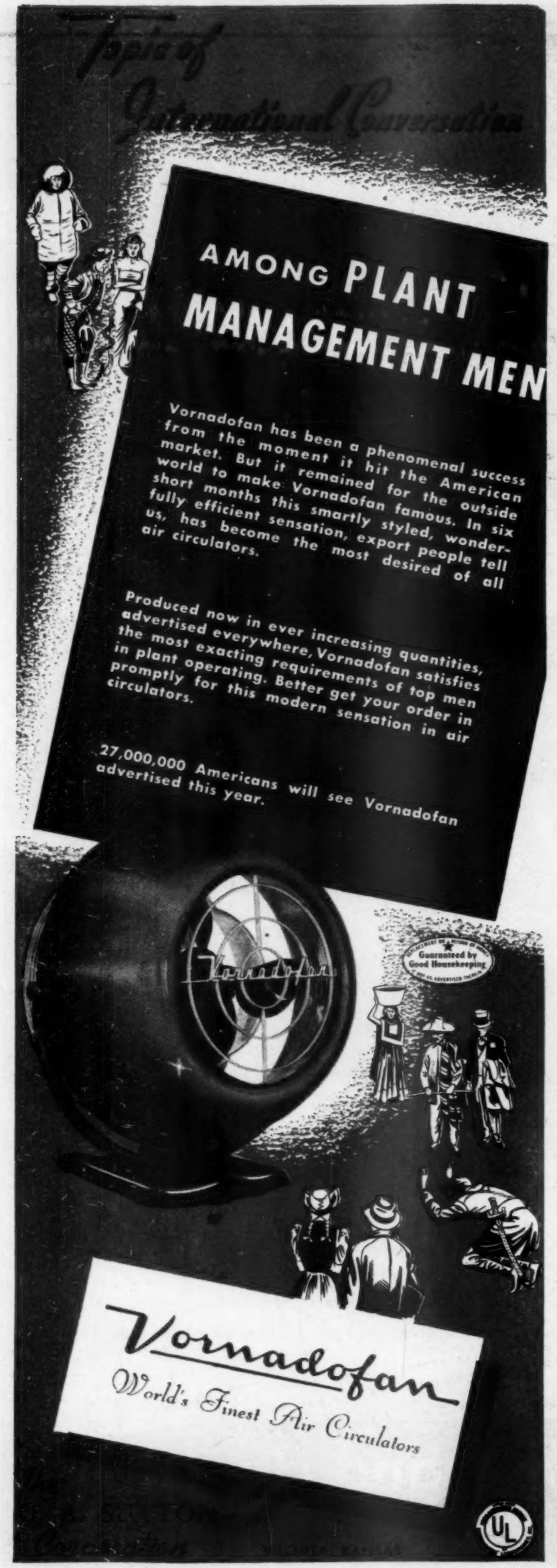
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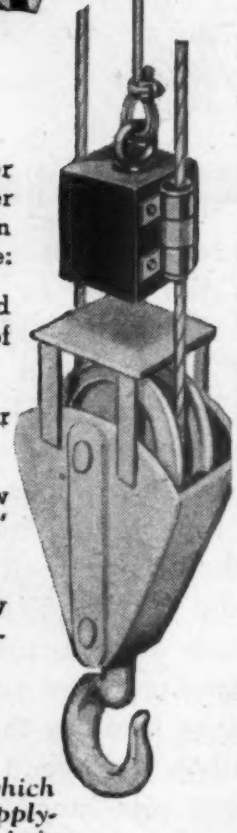

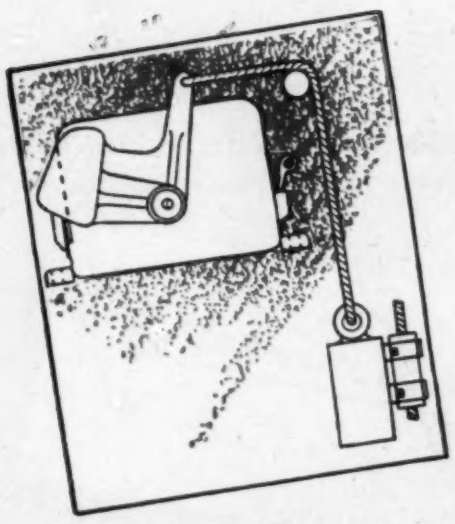

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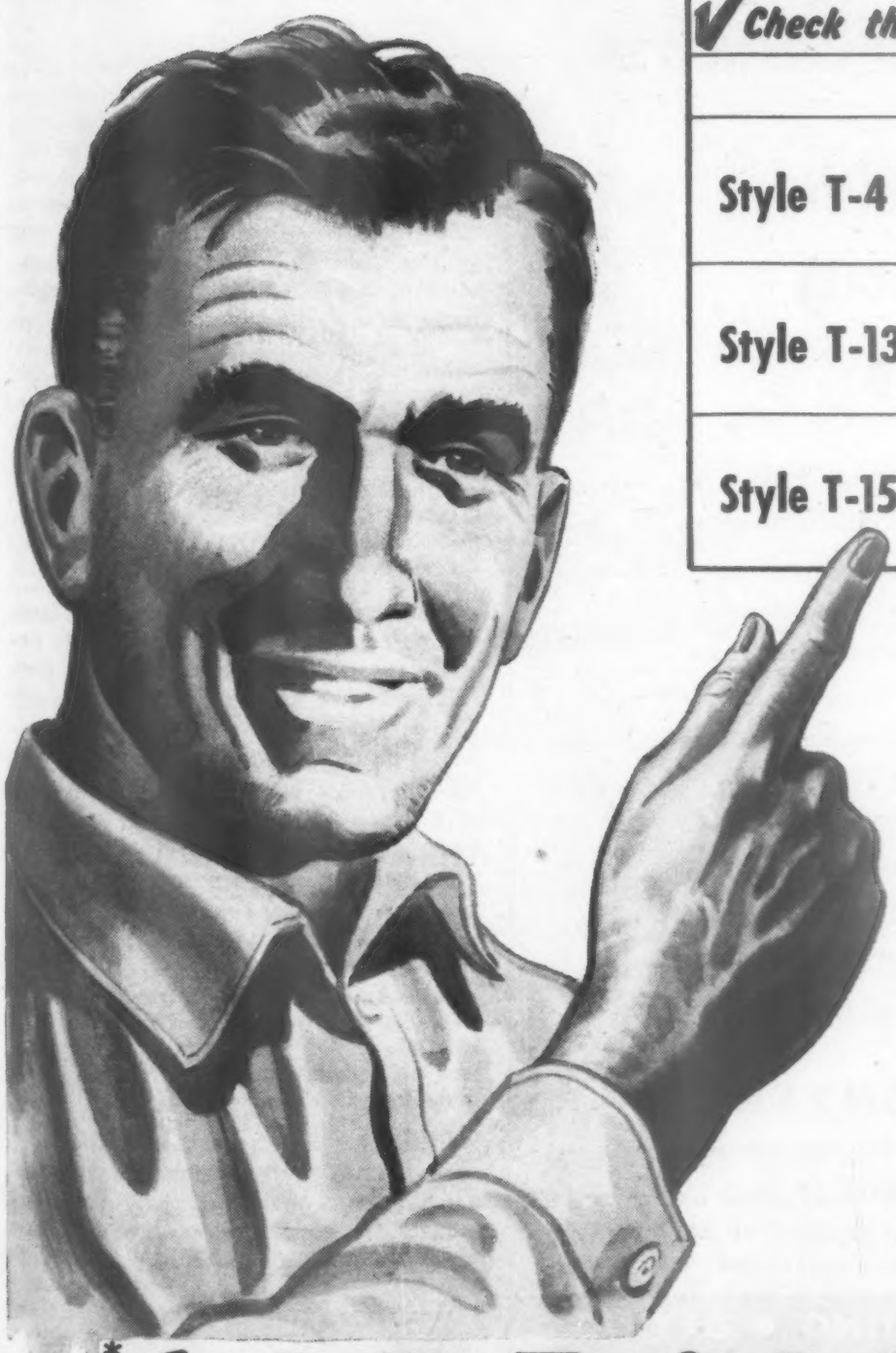

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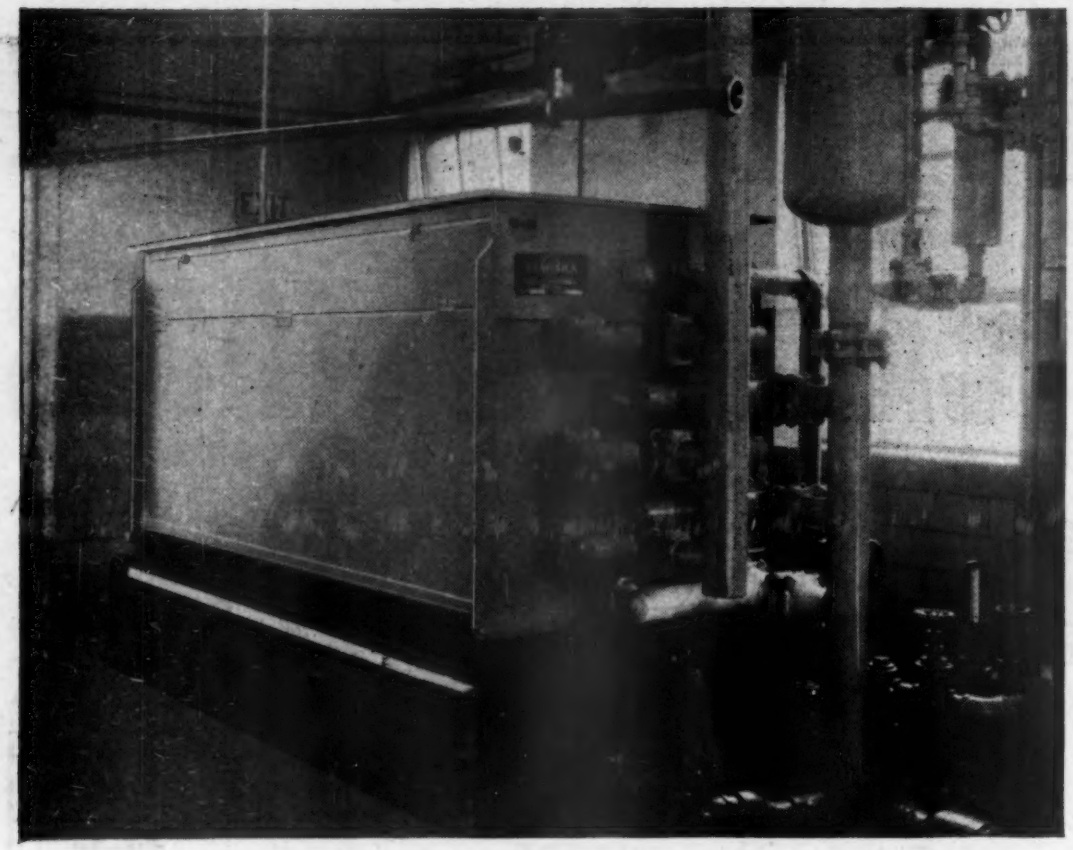

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HAROLD W. METZ and **MEYER JACOBSTEIN.** The Brookings Institution, Washington, D. C. 164 pages. Index. $2.25.

In three parts, the first provides the background of federal intervention, summarizes the federal labor policy, and discusses political aspects of the labor movement. The second part considers national goals and requirements, and the third covers the national labor policy on organization, collective bargaining, the NLRB, and various other aspects of labor activity.

THE GUARANTEE OF WORK AND WAGES

JOSEPH L. SNIDER, Professor of Business Economics, Graduate School of Business Administration, Harvard University. Div. of Research, Grad. School of Bus. Admin., Harvard University, Boston. 191 pages. Index. $2.75.

This volume presents results of a study of the experience of industry with guarantee plans, the problems to be met, and necessary conditions of success if the plan is to be widely adopted. It offers suggestions as to steps to be taken to assure security of work and wages, and concludes with a long-range view of the nature of ultimate employment security and ways in which it can be achieved.

THE TECHNIQUES OF HANDLING PEOPLE

DONALD A. LAIRD, Industrial Consultant, and **ELEANOR C. LAIRD,** Research Librarian. Whittlesey House, McGraw-Hill Book Co., 330 West 42nd St., New York 18. 139 pages. Photographs. $2.

Subtitled "The Eleven Secrets of Handling People." A book to help new executives and foremen understand their relations with the people they supervise. The experience of many of today's leaders of industry are cited, and their own opinions reported.

THE AMERICAN INDIVIDUAL ENTERPRISE SYSTEM, ITS NATURE, EVOLUTION AND FUTURE

Prepared by The Economic Principles Committee of the National Association of Manufacturers. McGraw-Hill Book Co., 330 West 42nd St., New York 18. 2 volumes, 1119 pages. Charts, graphs, marginal notes, appendix, index. $10.

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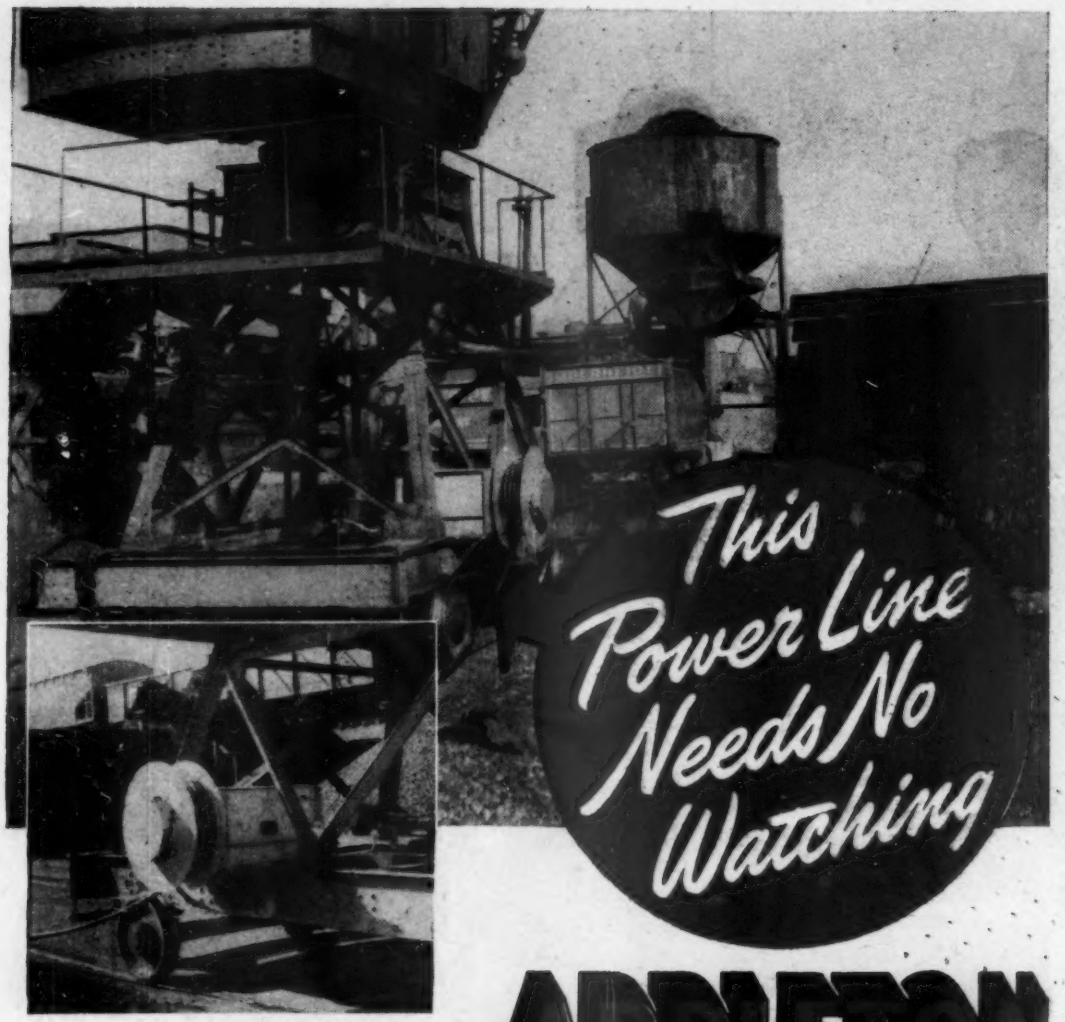

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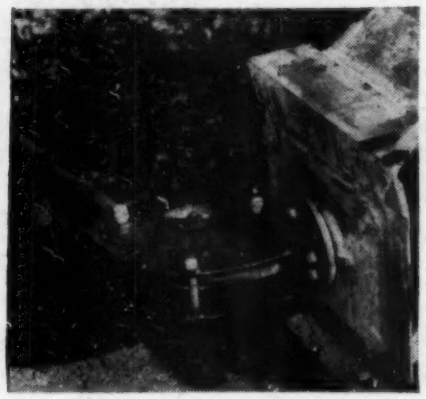

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Edited by **H. BENNETT**, Technical Director, Glyco Products Co., Inc. The Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 1055 pages. Tables, diagrams, formulas, pronunciation guide. $10.

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CHESTER L. DAWES, S.B., A.M., Dr. Eng., Associate Professor of Electrical Engineering, The Graduate School of Engineering, Harvard University. McGraw-Hill Book Co., 330 West 42nd St., New York 18. 708 pages. Photographs, diagrams, formulas, appendixes A through L, questions and problems, index. $5.

This fourth edition of Volume Two of the Electrical Engineering Texts Series has been enlarged to include recent developments in the field. Fundamental background material has been extended considerably, and its application to the study of electrical machinery and apparatus is explained in detail.

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EDWARD R. DEWEY, and **EDWIN F. DAKIN**, Henry Holt & Co., 257 Fourth Ave., New York 10. 255. Tables, graphs, charts, figures, appendixes I to III. $3.

In two parts, the first presents the idea that the influence of rhythm and periodicity is felt in our economic world as it is in the natural world, and that this influence, analyzed with statistical tools, can be made to display curvilinear forms and distinct rhythms. In the second part, the theories that underlie these ideas, suggested implications, and meanings are discussed.

BOOKLETS

COMMUNISTS WITHIN THE LABOR MOVEMENT—The Facts and Counter-Measures. Chamber of Commerce of the United States, Washington 6, D. C. 54 pages. Single copies, 50c; lower prices for quantities.

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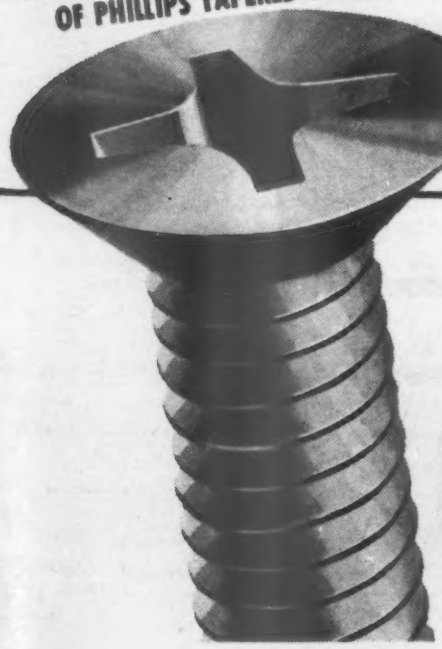

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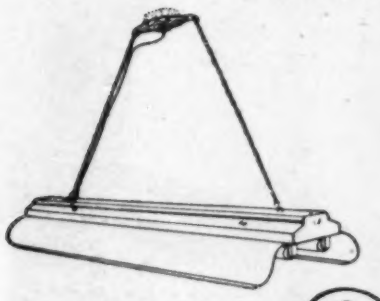

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CLEAN AIR (REMOVAL OF DUSTS)—No. 7, Controlling Chemical Hazards Series. Division of Labor Standards, U. S. Department of Labor, Washington 25, D. C. 24 pages. No charge for single copies, 10c each for quantities under 100, 25 per cent discount for 100 or more.

HEALTH IN INDUSTRY—Transactions Bulletin No. 8, 11th Annual Meeting. Industrial Hygiene Foundation, 4400 Fifth Ave., Pittsburgh 13, Pa. 116 pages. Photographs, tables, charts. No charge to members for single copies; $3 for additional copies.

FINANCIAL AND OPERATING RATIO SURVEYS BY TRADE ASSOCIATIONS—American Trade Association Executives, Washington, D. C. 32 pages. Tables. Single copies, $1 to members, $1.25 to non-members; lower prices for quantities.

COLLECTIVE BARGAINING: HOW TO MAKE IT MORE EFFECTIVE. A Statement on National Policy by the Research and Policy Committee of the Committee for Economic Development. Committee for Economic Development, 285 Madison Ave., New York 17. No charge for single copies; additional copies, 25c.

ON THE CALENDAR

MAY

15-16, American Leather Belting Association, National Meeting, Claridge Hotel, Atlantic City. E. R. Rath, Executive Vice-President, 41 Park Row, New York.

15-16, International Council of Industrial Editors, Annual Convention, Hotel Jefferson, St. Louis. Charles J. Morse, First Vice-President I.C.I.E., The Peoples Gas, Light & Coke Co., 122 South Michigan Ave., Chicago 3.

26-27, Association of Iron & Steel Engineers, Annual Spring Conference, Benjamin Franklin Hotel, Philadelphia. T. J. Ess, Managing Director, 1010 Empire Bldg., Pittsburgh.

26-28, Industrial Recreation Association, Annual Meeting, Edgewater Beach Hotel, Chicago. John W. Fulton, Executive Secretary, 1 North La Salle, Chicago 2.

26-29, National Fire Protection Association, 51st Annual Meeting, Palmer House, Chicago. Percy Bugbee, General Manager, 60 Batterymarch St., Boston 10.

JUNE

1-4, American Society of Heating and Ventilating Engineers, Semi-Annual

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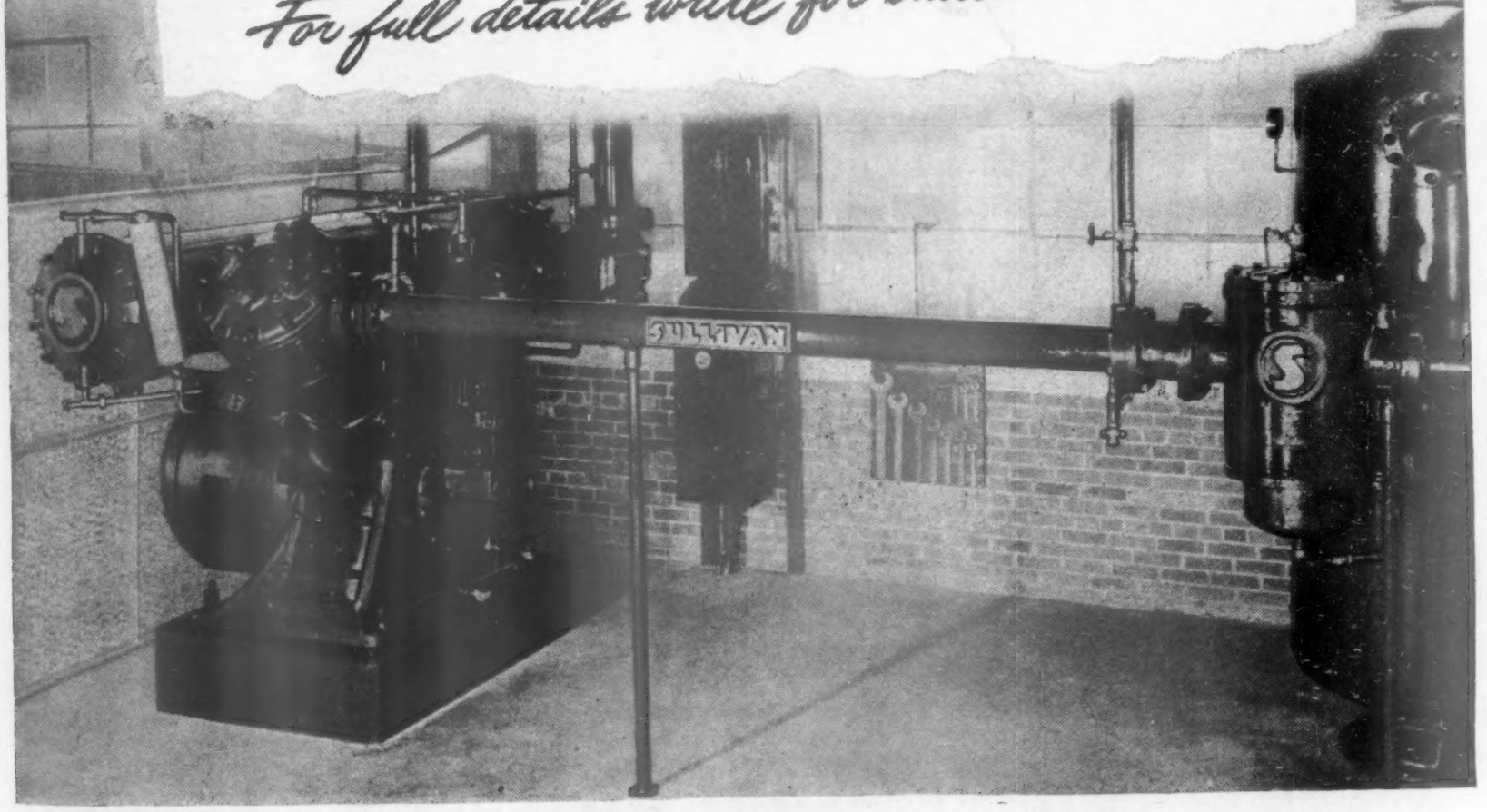

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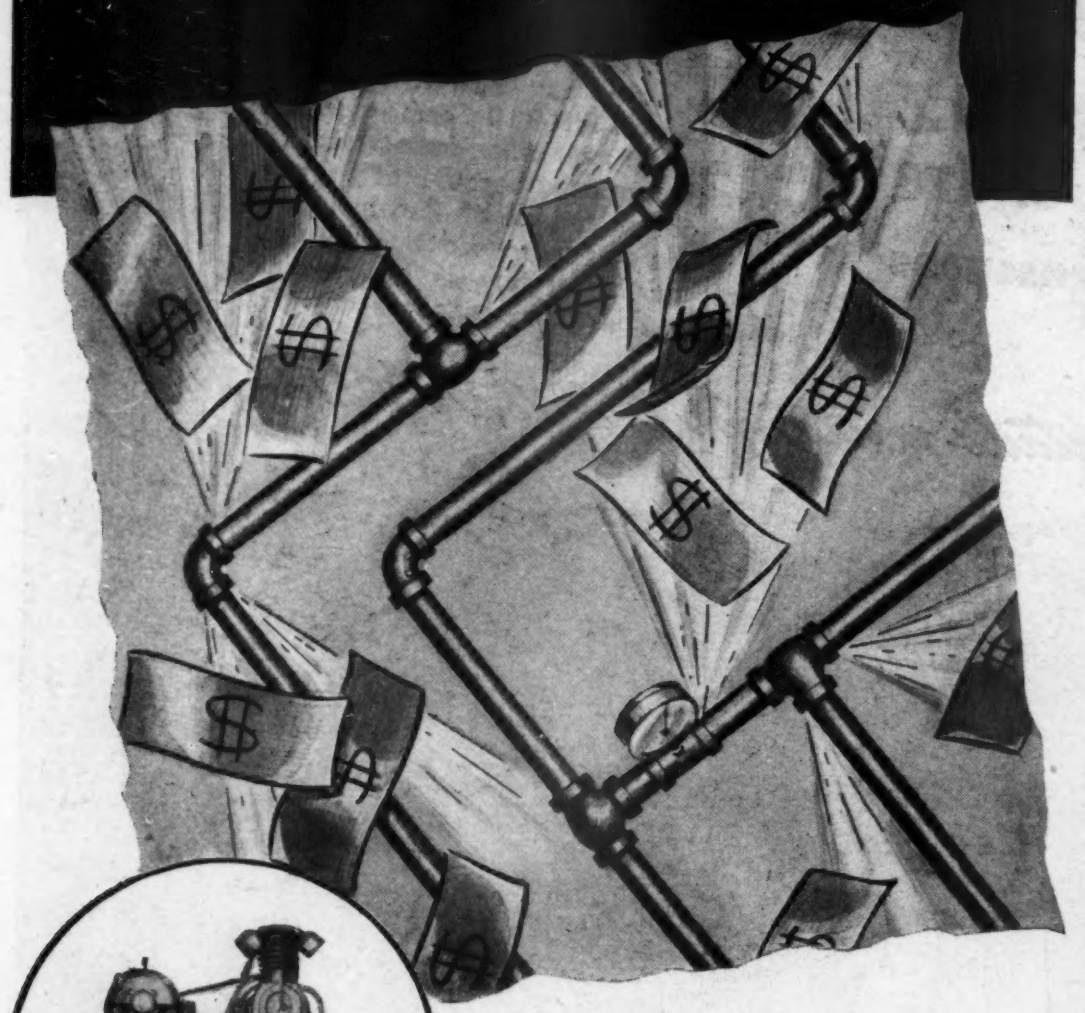

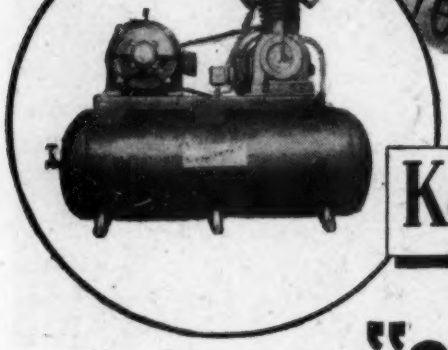

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Meeting, Hotel del Coronado, Coronado, Calif. A. V. Hutchinson, Secretary, 51 Madison Ave., New York.

2-4, National Association of Purchasing Agents, Annual Convention, Waldorf-Astoria, New York. G. A. Renard, Executive Secretary-Treasurer, 9 Park Place, New York 7.

9-11, American Society of Refrigerating Engineers, Spring Meeting, Alexandria Hotel, Los Angeles. R. H. Money, President, 40 West 40th St., New York.

9-13, American Institute of Electrical Engineers, Summer Convention, Mount Royal, Montreal. H. H. Henline, Secretary, 29 West 39th St., New York.

11-12, American Management Association, General Management Conference, Waldorf-Astoria Hotel, N. Y. James O. Rice, Manager, 330 West 42nd St., New York 18.

15-18, National Association of Cost Accountants, Annual Meeting, Palmer House, Chicago. Arthur Gunnarson, Assistant Secretary, 385 Madison Ave., New York.

16-19, American Society of Mechanical Engineers, Semi-Annual Meeting, Stevens Hotel, Chicago. Ernest Hartford, Executive Assistant Secretary, 29 West 39th St., New York.

16-20, American Society for Testing Materials, 50th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City. Robert J. Painter, Assistant Secretary, 1916 Race St., Philadelphia 3.

23-27, American Electroplaters' Society, Industrial Finishing Exposition, Convention Hall, Detroit. George L. Nankervis, General Chairman, 4484 Cass Ave., Detroit.

JULY

23-26, Silver Bay Conference on Industrial Relations, 29th Annual Conference, Silver Bay-on-Lake George, N. Y. William F. Meyer, Jr., Secretary for Industrial Services, 347 Madison Ave., New York.

AUGUST

26-29, American Institute of Electrical Engineers, Pacific General Meeting, San Diego Hotel, San Diego. H. H. Henline, Secretary, 33 West 39th St., New York.

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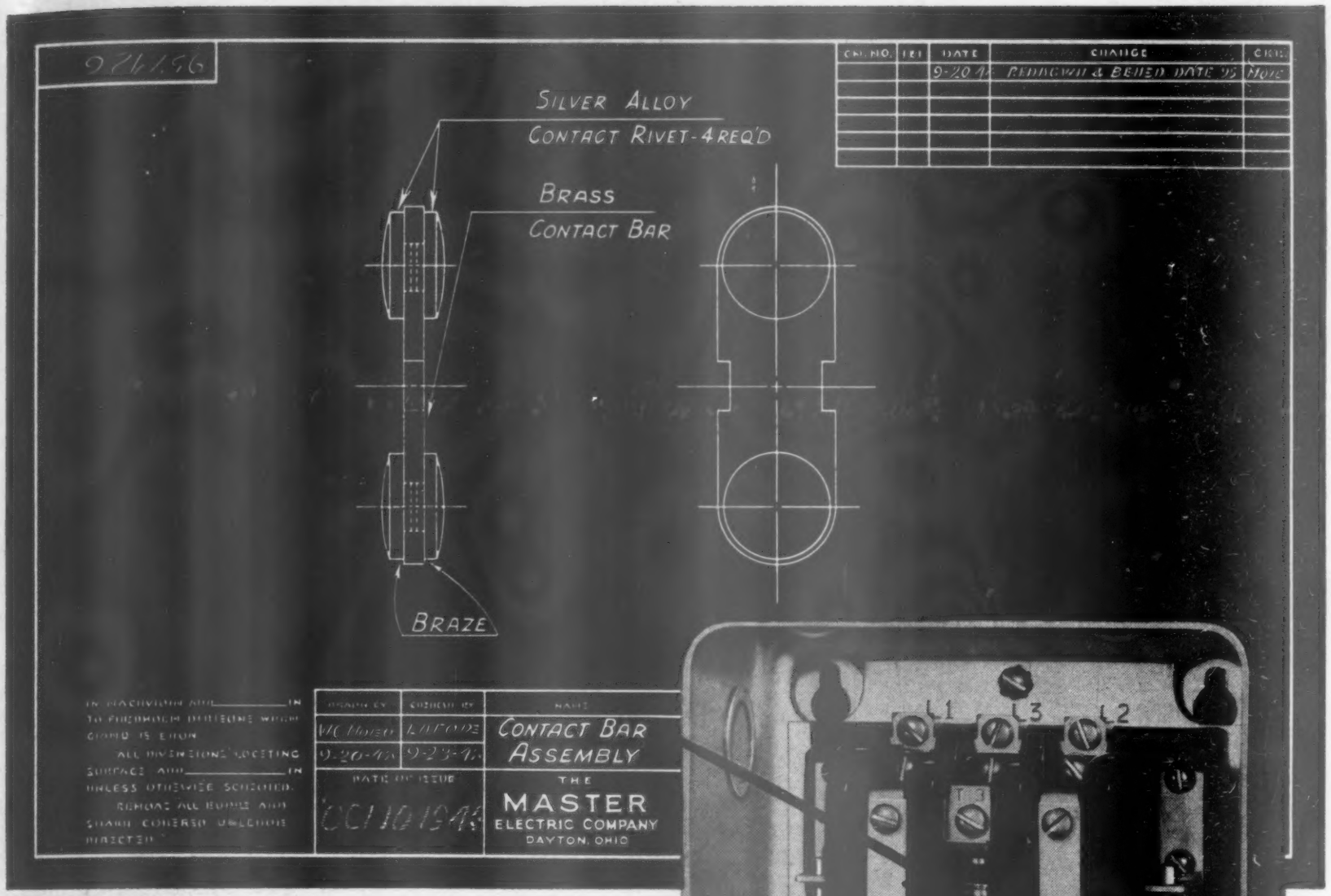
JUNE

9-17, Management Course devoted to Production Planning, Job Evaluation, Motion and Time Study, Wage Incentives, and related subjects. University of Iowa. Ralph M. Barnes, Professor of Industrial Engineering, University of Iowa, Iowa City.



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BEARINGS—General purpose bearings, oil grooving types, universal cored bars, babbitt, graphite bearings, electric motor bearings, and others are catalogued in 80-page text. Johnson Bronze Co.

4

BEARINGS—Revised catalog entitled "Powder Metallurgy" deals with self-lubricating porous bronze bearings, including plain, flanged, and self-aligning spherical types. Contains design styles, specifications, diagrams, graphs, tables of sizes. Keystone Carbon Co., Inc.

5

BUILDING SIGNS—Line of engraved plastic signs for buildings is described in folder. Also tells about signs of wood. Winters Stamp Mfg. Co.

6

CASTERS—Catalog 65-3, 44 pages, provides general information, technical data, and illustrations on casters. Cutaway photographs indicate construction, and diagrams and drawings show methods of mounting casters. The Rapids-Standard Co., Inc.

7

CASTINGS—Eight-page bulletin No. 24, Vol. 1, No. 1, contains news items on the engineering applications of metal castings in industry. Describes the brazing of cast iron to steel in conveyor idler, and other operations. Meehanite Metal Corp.

8

CHAIN BELTING—Bulletin 46-10, 12 pages, deals with Rex steel fabricated and cast chains and attachments, for power transmission and for conveying materials. Chain Belt Co.

9

CLAMPS—Eight-page Catalog 235 deals with a clamp master kit for clamping, splicing, tying, mending, and banding. Includes specifications, picture chart of typical applications, and instructions for operating the tools. Punch-Lok Co.

10

CLEANING PREPARATION—designated MC-1, for general maintenance use, steam gun, and tumble barrel cleaning, is outlined in 4-page Form 103. Lists uses, as well as other types of cleaners. Pennsylvania Salt Mfg. Co.

11

COMPRESSORS AND AFTERCOOLERS—Capacity, rating, specification, and dimension data on Air King compressors are featured in 4-page Bulletin H-620-B26. Aftercoolers for air and gas are treated in 4-page Bulletin L-802-B2.

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SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
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TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Supply Company, Chicago, *Warehouse Distributors*
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USS STAINLESS STEEL — UNITED STATES STEEL

UNITED STATES STEEL

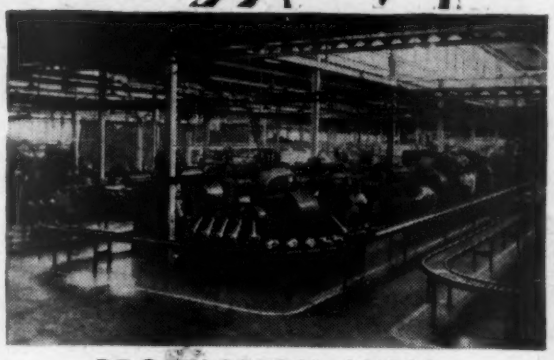
WHY CARRY WHEN YOU CAN CONVEY

Carrying is the oldest form of material handling—modern production demands faster, cheaper and more efficient material handling — conveyors.

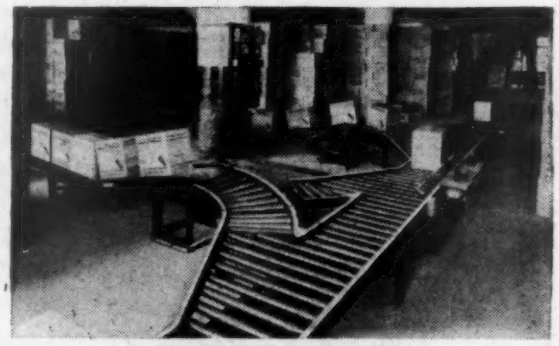
Investigate the use of conveyors. Conveyors handle a wide variety of parts, packages, units, cans, bottles, barrels, bundles, drums and boxes. Available in light, medium or heavy-duty types — portable or stationary — as systems, sections or units — power or gravity fed, they give you remarkable savings in time, money and manpower conservation. They relieve confusion and congestion.

Standard Conveyor Company has the experience and facilities to engineer, recommend and furnish the right type of conveyor for your particular needs.

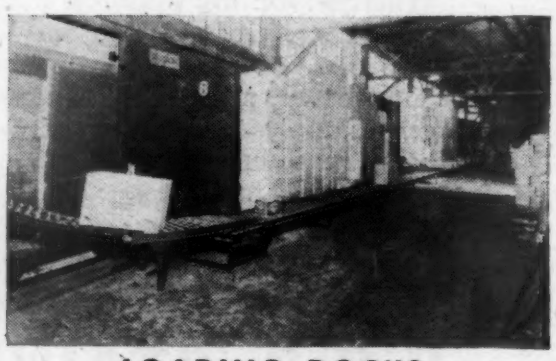
Write today for catalog No. FM-547 "Conveyors by Standard" — a ready reference on conveyor types and systems.



PRODUCTION LINES
No congestion — order and cleanliness when production moves on conveyors.



WAREHOUSES
Merchandise flows in and out of storage with order and system on conveyors.



LOADING DOCKS
Load or unload shipments in half the time with conveyors.

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities

ROLLER · BELT · SLAT · PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

containing technical data and photographs. Worthington Pump & Machinery Corp.

12

CONCRETE MIXER—Bulletin describes small portable concrete mixer for use in maintenance work around the plant. Muller Machinery Co.

13

CONDENSER—Illustrated Bulletin 103 tells about the Aero-Pass condenser. Design and operation are depicted. Niagara Blower Co.

14

CONTROL SYSTEM—Electronic servomechanism, called Motron Servo Model 61A, for air velocity control; vehicle steering or cam following; and tensioning, guiding, and winding wire, is explained in illustrated leaflet H-26. W. C. Robinette Co.

15

CONVEYORS—Bulletin 147 is devoted to gravity roller conveyors, and Y and 45-deg. Flipswitches, illustrating installations. Bulletin SLJ-247 depicts an adjustable, reversible, portable, powered, endless belt conveyor. Speedways Conveyors, Inc.

16

COUPLINGS—Illustrations and descriptions of Type F Steelflex couplings for motor and turbine applications are presented in 32-page Bulletin 4100. The Falk Corp.

17

CRANE CONTROLS—Descriptions, wiring diagrams, performance curves, and an application guide are compiled into a 20-page Catalog B-3853 on a.c. magnetic crane controls. Westinghouse Electric Corp.

18

DUST COLLECTION—Entitled "Practical information on Dust Collection," revised Bulletin FY-142 discusses basic principles of dust collecting systems. Contains tables on air velocities, air handled by pipes. Whiting Corp.

19

EARTH-MOVING TRUCKS—for plant site grading and other applications, are pictured in action in 12-page brochure. R. G. LeTourneau, Inc.

20

ELECTRIC MOTORS—"Handy Guide for Quick Selection of Electric Motors" is the title of 12-page text No. 51B6052G. Covers motor characteristics, engineering data, construction, dimensions, applications. Allis-Chalmers Mfg. Co.

21

ELECTRONIC EQUIPMENT—as well as radio products, fluorescent lighting units, intercommunication systems, and other apparatus are listed in 164-page 1947 catalog. Allied Radio Corp.

22

ENGINE GENERATORS—diesel type, rated at ½ to 9 kw., for a.c. or d.c., are presented in Bulletin 241-2. Covers capacity, dimensions, and fuel consumption. The Ready-Power Co.

23

FASTENINGS—known as Speed Nuts, that are self-locking, are catalogued in Bulletin 217. Chart indicates variety of uses, and pictures show method of insertion. Tinnerman Products, Inc.

24

FILES—Reference booklet, 24 pages, lists different patterns, sizes, and cuts of hand

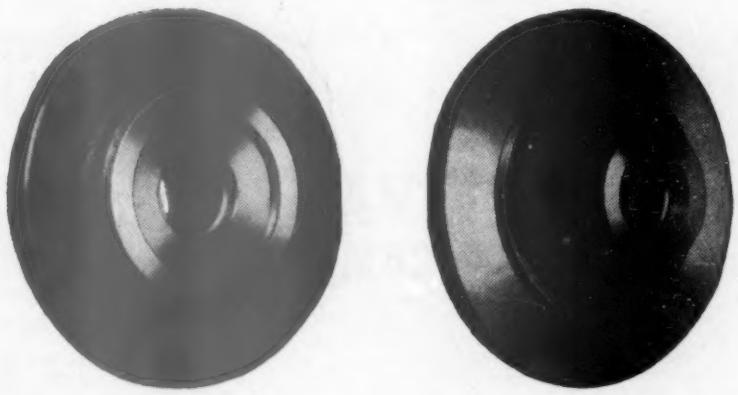
Can you use a "SECOND-STRETCHER"?

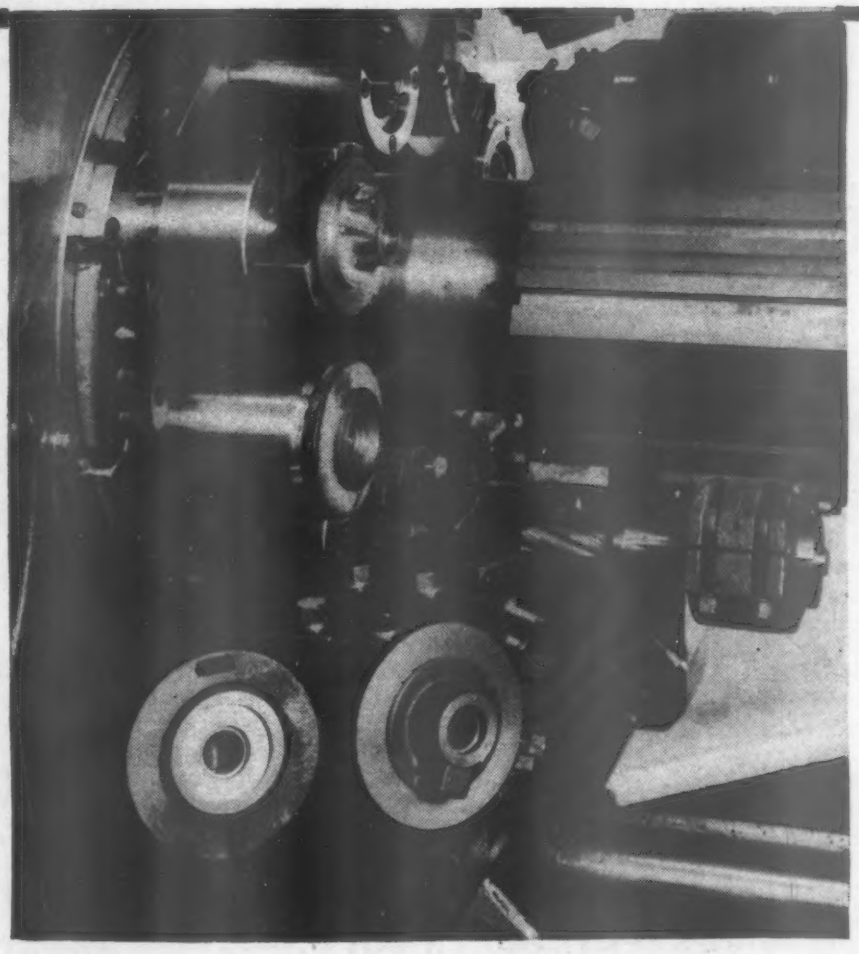
That's a machine that does as much work in one second as other machines do in 2 or 3 seconds.

National Acme offers industry a wide range of these modern multi spindle Acme-Gridley Automatics—both bar and chucking types.

They are all designed to help you keep production costs low in spite of advancing wage rates and higher prices for raw materials.

We'd like to discuss with you the application of up-to-date, long-run production methods of Acme-Gridleys on work in your plant.



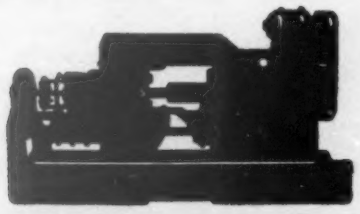


You might have this kind of job to produce

Here is a case that proves the point, selected from many thousands on which we have records.

This 5" flange starts with a Meehanite casting. A 6" RPA, 8 spindle Acme-Gridley Chucker finishes both ends, with two sets of tools, double index, pieces loaded in alternate positions.

There are 9 operations on the small end, 6 operations on the large end, a total of 15 operations, completed in 31 seconds per piece—116 pieces per hour machine time.



THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
Maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

Our Best Friend and Yours, Too

The Distributor of Industrial Supplies

In wartime, and in the equally acute situation of the present, he has fulfilled our appeal "to keep the freight cars moving swiftly."

His warehouse is the short cut to quick delivery of our essential tools and parts. He saves time, money and costly delays.

All Leading Distributors Stock the *Badger* Line

ADVANCE CAR MOVER COMPANY

APPLETON • WIS.

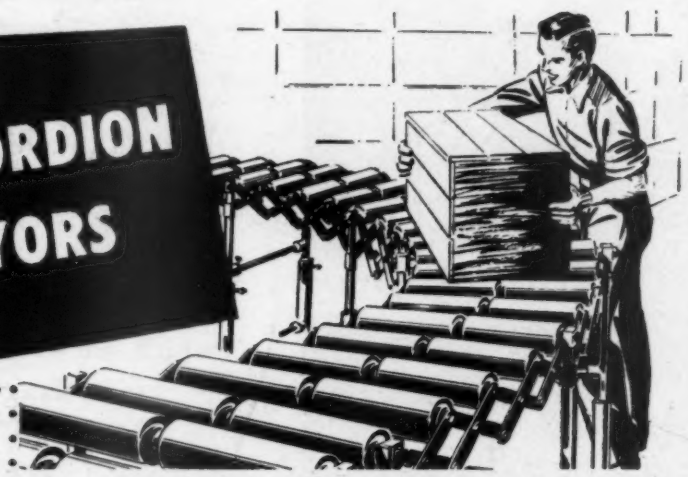
CANADIAN FACTORY—CANADIAN ADVANCE CAR MOVER CO. WELLAND, ONTARIO CANADA

CAR MOVERS: Badger . . . Power King . . . New Badger

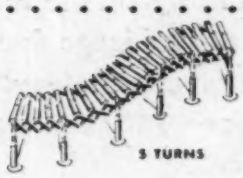
PARTS: Spurs . . . Handles (Straight-grained Hardwood)

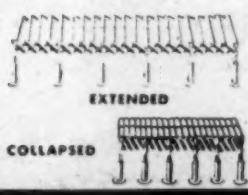
For All Makes

FMC ACCORDION CONVEYORS



Roller design keeps box on conveyor regardless of curves





A complete, sectional conveyor system that can be set up anywhere in a few minutes by one person. Gravity principle—boxes and packages roll to point wanted. Adjustable for speed. Split roller construction requires no guard rails to prevent boxes from falling off when going around curves or sharp turns.

Every section can be extended or contracted, twisted into curves or "S" turns, used wherever a portable, extensible, collapsible and flexible conveyor is desired.

To move, turn upside down and roll on its own conveyor rollers. Standard width of units are 14" and 18". When not in use, the sections can be folded up. Requires little storage space.

A sturdy, dependable conveyor system that will give years of satisfactory service. Send for literature. Department FM-1.

FOOD MACHINERY CORPORATION

RIVERSIDE DIVISION • RIVERSIDE, CALIFORNIA

and machine files and riflers, rotary and deburring files, and countersinks. Each type is pictured. Grobet File Co. of America, Inc.

25

FIRE HOSE—Six-page illustrated folder discusses line of industrial fire hose including Monarch brand single and double jacket hose and Ajax brand mill hose. Hewitt Rubber Div., Hewitt-Robins, Inc.

26

FIRE POT—operating at a pressure of 20 to 30 pounds, is the subject of 2-page circular. Internal structure is displayed in cutaway view. Turner Brass Works.

27

FLOOR ARMOR—called Floorsteel, a flexible grid for resurfacing worn-out floors, is the subject of 4-page Form 400. Pictures indicate method of laying the material. Wm. F. Klemp Co.

28

FLOOR LINER—gravity feed brush type, on wheels, is introduced in 4-page pamphlet. Operation is explained, and specifications and dimensions are listed. Weaver Machine Co.

29

FLOOR MARKING MACHINE—providing safety and parking lines, is described in circular. Lists features and specifications. H. C. Sweet Co.

30

FLOORING—of non-slip alundum terrazzo aggregate, cement floor aggregate, and tile, is the subject of 8-page brochure. Properties and characteristics are described. Norton Co.

31

FLUORESCENT REFLECTORS—continuous-line type, are illustrated and described in broadside. Lists catalog numbers, types, sizes, and other data. Litecontrol Corp.

32

GAS ALARMS—Combustible gas alarm, adaptable for controlling processes or ventilation equipment, is explained in 4-page Bulletin DT-1. Bulletin DR-1 introduces a carbon monoxide alarm. Mine Safety Appliances Co.

33

GAS PURGER—for non-condensable gases in refrigeration systems, is set forth in 8-page Bulletin No. 173. Includes data on installation and operation. Armstrong Machine Works.

34

HAND TRUCKS—of tubular construction are offered in 4-page pamphlet. Features of design are discussed, and sketches supplement descriptions. Tubar Bending & Mfg. Co.

35

HEATING SYSTEM—consisting of Type WI extended surface radiation, is set forth in 8-page Bulletin B 1550A. Construction details, mounting, covers, installation, applications, dimensions, and ratings are featured. Warren Webster & Co.

36

HOISTS—spur-geared type, are discussed in 4-page Bulletin SU-40. Features of construction are indicated on exploded view, and models in capacities up to 20 tons are illustrated. David Round & Son.

37

HYDRAULIC CLAMP UNIT—for actuating lathe chucks, clamp cylinders for fixtures, and other uses, is depicted in Bulletin 305-U. Lists features, and sup-

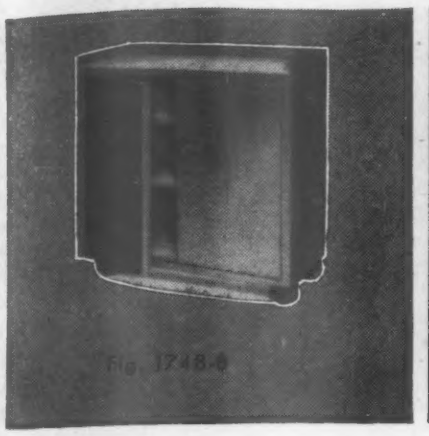


Fig. 1748-B

Fig. 1334

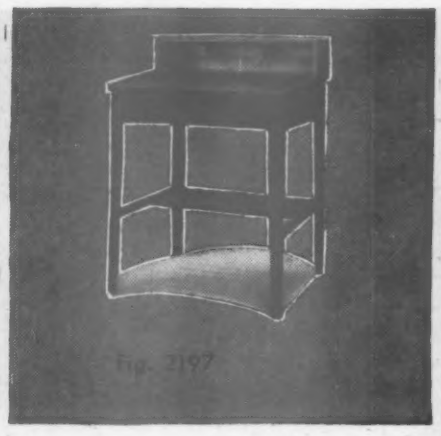
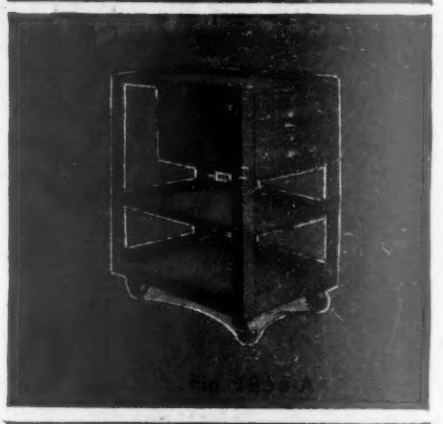


Fig. 2197

Fig. 1249



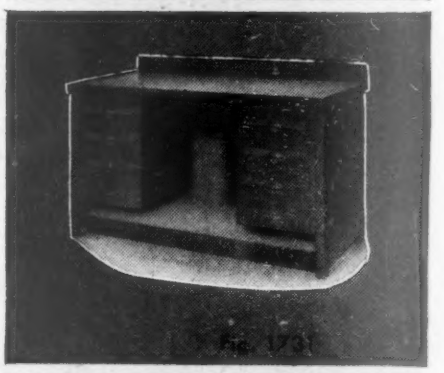


Fig. 1731

Fig. 70

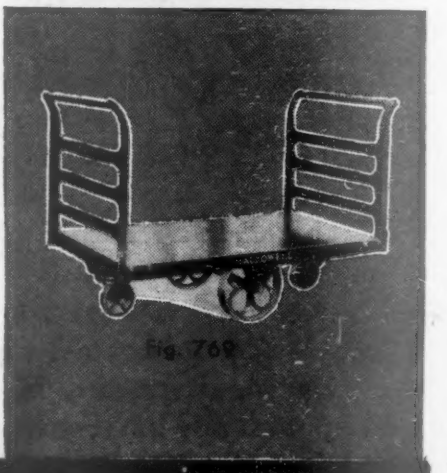


Fig. 769

HALLOWELL

SHOP EQUIPMENT OF STEEL

. . . designed for comfort and utility

. . . built for long service and hard wear

and the most exacting requirements of shop and factory can be filled easily with "Hallowell" Shop Equipment of Steel. It comprises: Stools, chairs, work-benches, foremen's desks, tool cabinets, and trucks—in a wide variety of styles and sizes built of sturdy, hard-wearing steel—a construction that has made "Hallowell" a *buy word*.

Write for your copy of the "Hallowell" Catalog. It's a handy reference when you order your shop Equipment of Steel.

"Unbrako" and "Hallowell" Products are sold entirely through Distributors.

OVER 44 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

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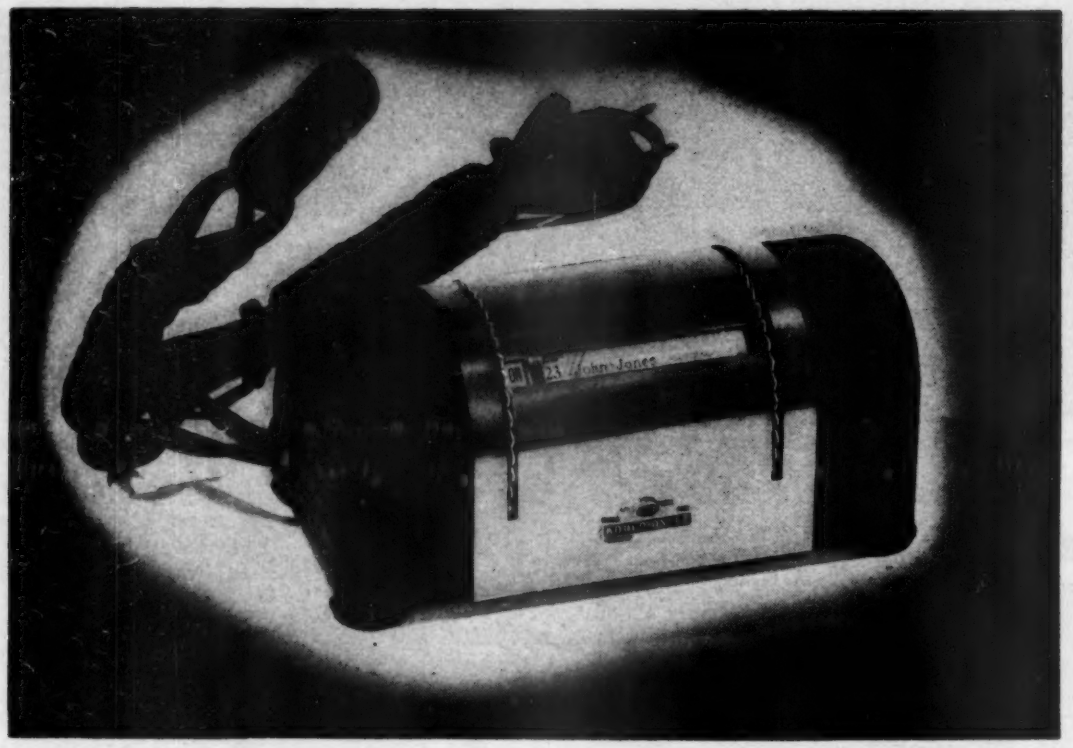
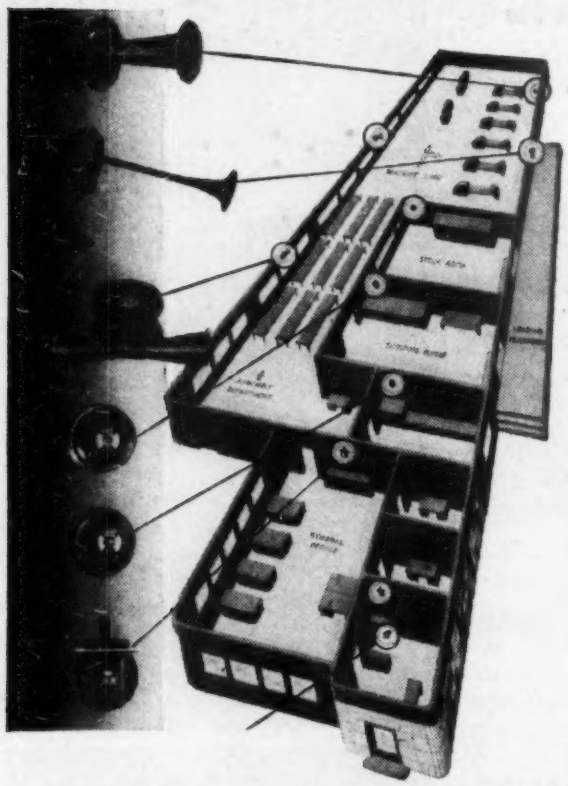


FARADAY KODEMASTER

Gets the right man in a jiffy!



A long distance call—an important conference—can't wait for the operator to telephone all around the plant. Time is valuable—too expensive to waste! Kodemaster will get the right man in a jiffy—only a few seconds and its message reaches every nook and corner of the plant and the man is located.

Every factory large enough for a telephone switchboard needs the efficient Faraday Kodemaster. It's the ideal system for locating individuals in a hurry—up to 30 different code signals.

Kodemaster is a unique, compact, fool-proof control for *old* or *new* signal systems. May be set up with any number or combination of bells, buzzers, horns, Kodaires, chimes, sirens.

For time-saving signaling, and low installation and maintenance cost, install Faraday Kodemaster. Can be installed by any competent electrician.

FARADAY UNIPACT units are interchangeable, "as easy as plugging in a toaster."

At your electrical distributor's

FARADAY
ELECTRIC CORPORATION
Adrian, Michigan

plies installation diagrams, specifications, and ratings. John S. Barnes Corp.

38

HYDRAULIC POWER UNITS—Eight-page Bulletin 46-43 contains information on hydraulic power units, including motor-pump and separate motor types. Bulletin No. 46-48, 4 pages, deals with a hydraulic power pack for lifting, lowering, pushing, pulling, loading. Vickers, Inc.

39

HYDRAULIC PUMP—Four-page folder describes Series S-125 rotary pumps for hydraulic oil systems, lubricants, gases, lifts, and hoists. Furnishes performance charts; data on capacity, pressure, and vacuum; and diagram. Ellipse Corp.

40

INDUCTION MOTORS—Publication No. 188 is a die-cut 4-page folder in the form of the heavy-duty squirrel-cage induction motor it describes. Electric Machinery Mfg. Co.

41

INDUCTION MOTORS—vertical type, for pump drive, in 1- to 500-hp. models, are announced in 8-page form GEA-4645. Construction and mechanical features are described and illustrated. Dimensions, ratings, and specifications are given. Apparatus Dept., General Electric Co.

42

INDUCTION MOTORS—Four-page Bulletin C-125 deals with enclosed fan-cooled Series C induction motors for 2- and 3-phase a.c. circuits. Construction is described and illustrated, and sectional view indicates principle of design. Reliance Electric & Eng. Co.

43

INDUSTRIAL FACILITIES—"The A-B-C's of Industrial and Commercial Jacksonville, Florida" is the title of booklet outlining facilities available for industries. Covers labor supply, transportation, raw materials, markets, power and fuel, water supply, taxes, plant sites. Jacksonville Chamber of Commerce.

44

INFRA-RED UNITS—Twelve-page publication is devoted to infra-red equipment for baking, drying, dehydrating, preheating, or other heating operations. The Fostoria Pressed Steel Corp.

45

IRON WELDING—Method of welding malleable iron and cast iron is explained in two procedure sheets featuring the use of coated aluminum bronze electrodes and shielded arc phosphor-bronze electrodes. Ampco Metal, Inc.

46

JET PUMPS—Method of determining the correct type of portable jet pump for individual requirements is presented in Bulletin 315. Describes principles of operation, and supplies selection charts, tables. Derbyshire Machine & Tool Co.

47

LADDERS—as well as scaffold board and A jacks of aluminum are pictured in 6-page folder. Data sheets provide information on construction, weight, durability, specifications, performance tests, other details. Mason Products Co., Inc.

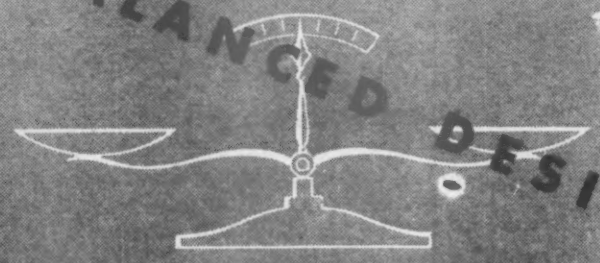
48

LATHES—Catalog 13-F, 8 pages, describes 13-in. swing, quick-change gear and toolroom lathes, attachments, and accessories. The equipment is photographically illustrated. South Bend Lathe Works.

49

LIFT TRUCK—Model D gasoline-powered hydraulic lift truck is presented, with

A FEATURE OF GAYLORD BALANCED DESIGN . . .



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Control of every step of design and processing enables Gaylord to produce boxes of maximum uniformity.

GAYLORD CONTAINER CORPORATION, General Offices: SAINT LOUIS

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- Folding Cartons
- Kraft Grocery Bags and Sacks
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. . . STANDARD OF THE PACKAGING INDUSTRY

124

- Bright, clear, *weather-proof* marks
- Always ready for use—handy as a pencil
- Point will not get hard or crusty
- Economical—time saving
- Big, husky sticks
- Eliminates messy paint pots and brushes

Paintmarx may be used to mark any surface that will take paint, whether wet or dry—in the tropics or in the arctic.

Send for FREE Industrial Crayon Guide.
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NEW YORK SAN FRANCISCO DALLAS

illustrations, in 6-page folder. Contains specifications, dimensioned engineering drawings, construction details, and price. Truck-Man, Inc.

50

LIFT TRUCKS—Devoted to electric platform and pallet type lift trucks, called Worksaver, 8-page publication describes and pictures construction features, operation, and applications. The Yale & Towne Mfg. Co.

51

LIGHTING FIXTURES—Photographs illustrate different types of adjustable lighting fixtures for wall, bench, and conduit mounting, in 4-page Bulletin 47. The O. C. White Co.

52

MACHINE GUARDS—of transparent plastic, called Magnetic Grip-Shields, for protecting workers from chips, are pictured and explained in circular. The Dilley Mfg. Co.

53

MACHINE GUARDS—made of transparent plastic, called Plexiglas, to protect the operator, are set forth in 12-page brochure. Pictures types for different operations. Rohm & Haas Co.

54

MAGNETIC SEPARATORS—permanent type, for eliminating tramp iron and steel particles and pieces during manufacturing or processing operations, are depicted in 4-page folder. The Homer Mfg. Co. Inc.

55

MAINTENANCE MATERIALS—for grouting; repairs to concrete floors, buildings, and masonry; and for waterproofing, are treated in illustrated manual. Explains operations involved, and supplies technical data. The Master Builders Co.

56

MATERIAL RACKS—that bring each piece to operator's hand-level automatically, as soon as preceding piece has been removed, are featured in 4-page folder DM-93. American Machine & Foundry Co.

57

MATERIALS HANDLING EQUIPMENT—including industrial tractors, fork trucks, truck-tractors, and fork truck attachments, is pictorially presented in 36-page catalog. Clark Tructractor Div., Clark Equipment Co.

58

MATERIALS HANDLING EQUIPMENT—Hand and power trucks, skids and boxes, bridge ramp, conveyors, pallets, grabs, and other equipment are pictorially presented in circular. Ohio Equipment Co.

59

METAL FRAMING—that can be used for supporting equipment, cable, and conduit; for heavy die and other storage; for assembly or conveyor table; and other adaptations, is depicted in 4-page Form GB-1. Unistrut Products Co.

60

METAL PARTS WASHERS—providing "active soak and wash action" are introduced in illustrated circular. Equipment is pictured, and specifications are furnished. The Super-Soak Co.

61

MODELS OF MACHINERY—and general plant equipment, made to scale, for planning layouts, are featured in brochure. Stark Industrial Models.

62

MOTOR CONTROLS—manual and magnetic starters, pushbutton stations, and enclosed switches, are presented in 124-

STOP FIRES
before they start!
PLUNGER CAN . . . provides safe — speedy way of dispensing flammable liquids. . steps up production and economizes solvents in all cleaning and swabbing operations. Available in 5 sizes . . . F.M. approved.
Loss of life, property, and *profits* avoided by proper application of PROTECTOSEAL equipment. Write for catalog.
The PROTECTOSEAL CO., 1962 S. WESTERN AVE., CHICAGO 8

Magnesium Castings Are Available Now

Often at Equal or Less Cost

Because of their excellent machining qualities, magnesium castings often cost less than finished castings of other metals. We make Magnesium alloy castings of all sizes, from a fraction of an inch up to six feet in diameter for a variety of uses, including aircraft, textile machines, office equipment, scales, fish line manufacturing, vacuum cleaners and toys. Why not investigate the possibilities of using Magnesium?

Write for Complete Information to

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Magnesium and Aluminum Castings
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SAFER TO WORK WITH...

Thor AIR HOSE COUPLINGS

Thor Air Hose Couplings form positively locked connections that cannot break, jar or whip apart. Tool operators prefer their simplicity . . . and the speed and ease with which they can be connected and disconnected. All sizes and combinations are interchangeable up to ¾ inches, inclusive. Each hose end is identical with the other—no right or left . . . no male or female—*a real universal coupling that fits every job.* Made of heavy, rust-resisting steel for lasting service. Call your Thor distributor for a demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY

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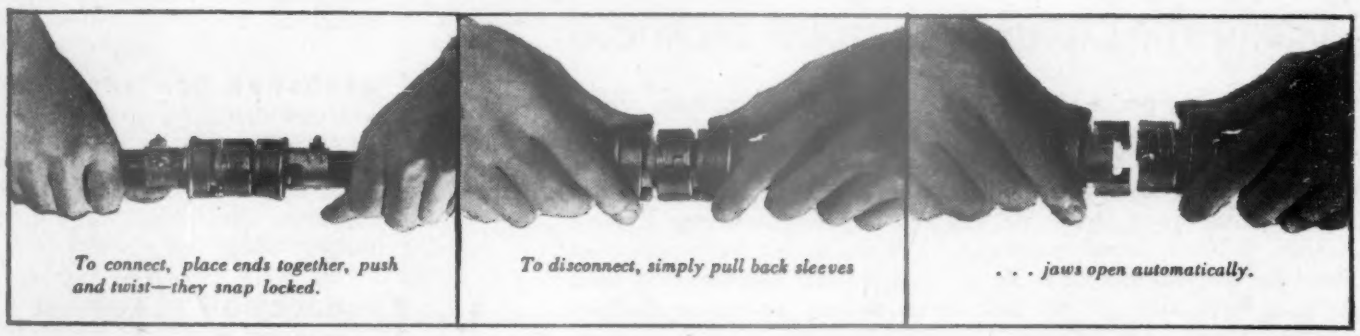
Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit Houston Los Angeles Milwaukee
New York Philadelphia Pittsburgh St. Louis St. Paul Salt Lake City San Francisco Toronto, Canada London, England



To connect, place ends together, push and twist—they snap locked.

To disconnect, simply pull back sleeves

. . . jaws open automatically.

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

Seven league boots are out of date!

The fastest way *these* **days to get supplies and parts for** clamoring customers is by super-speedy Air Express. It's like having all your suppliers "right next door" when you specify Air Express delivery. No source — including many abroad — is more than mere hours away.

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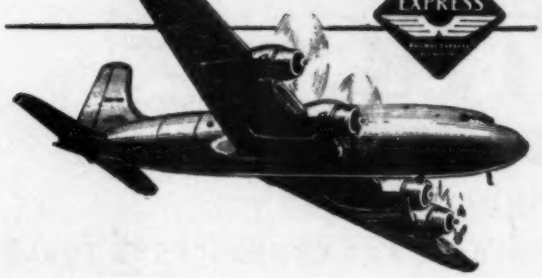

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page Catalog 10. Covers functions, ratings, designs, and other details. Pictures each unit. The Arrow-Hart & Hegeman Electric Co.

63

MOVING STAIRWAYS—trade-named Escalators, are depicted in 20-page booklet. Discusses location, maintenance, components, safety features, and drive assembly. Cutaway portrays construction of the system. Otis Elevator Co.

64

OIL SEPARATORS—for compressors from 1/6 horsepower to 50 tons are treated in Form T-210. Discusses low temperature and air conditioning installations, operating pressures, capacities, mountings, and sectional view shows design. Temprite Products Corp.

65

OVERHEAD HANDLING EQUIPMENT—consisting of trolleys, cranes, and hoists, is the subject of 56-page Bulletin C-1. Units for transporting different types of materials are described, sketches show construction. American Monorail Co.

66

PACKINGS—Sixteen-page condensed catalog contains illustrations and descriptions of mechanical packings. Chart indicates style numbers of packings for different purposes. Raybestos-Manhattan, Inc.

67

PALLETS—Catalog illustrates different types of pallets and their applications. Variations in pallet construction for handling boxes, bales, barrels, machine parts, and other materials, are set forth. Acme Pallet Co.

68

PANELING—called Plymetl, fabricated of plywood and metal, for constructing partitions, interior doors, shelves, panels, boxes, and other uses, is described in 12-page text. Haskelite Mfg. Corp.

69

PLANT LOCATION—"Industries Thrive in Chicago and Northern Illinois" is the title of booklet describing natural and economic resources of the area. Contains a map showing rail, highway, water, air, and pipeline routes, and another showing railroad terminals and industrial districts. Commonwealth Edison Co.

70

PRESSURE CONTROLLERS—Engineering, operating, and maintenance data on pressure controllers, external-pilot-operated, are compiled in 20-page Bulletin 462. Cross-sections portray design features, and selection charts and capacity tables are furnished. Leslie Co.

71

PRODUCTION PLANNING—Entitled "Changing Attitudes in Industry," brochure describes programs worked out for industrial organizations to increase production and to improve employee relations. Hall & Liles.

72

PROTECTIVE COATINGS—Corrosion-resistant coating, called Dy-Nes-Co, for metals, wood, brick, and concrete, is described in 4-page folder. Another pamphlet features a protective coating, named Dyna-Clad 1060, for waterproofing. A third text covers Dyna-Flex 2020, a plastic, strip film protective coating. The Merchants Chemical Co.

73

PROTECTIVE COATINGS—Application specifications explain methods for cor-

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rosion-proofing metal and masonry surfaces with protective coatings. Prufcoat Laboratories, Inc.

74

PUMP—for handling hot or cold acids and corrosive solutions, is treated in 6-page Bulletin 308-R. Explains construction, and sectional drawing shows stuffing box detail. Different assemblies are pictured. Oliver United Filters, Inc.

75

PUMPS—Deepwell turbine pump and electric motor unit is described in 12-page Bulletin 46-5000. A second booklet, No. 46-6000, tells about the Hydropress pump for high-pressure, low-volume pumping. Byron Jackson Co.

76

PUMPS—Catalog B-1146 is devoted to Type CS, vertically split case multistage pumps for clear liquids, in models ranging from 50- to 200-g.p.m. capacity. Details of construction are provided with diagrams, and performance curves are included. Economy Pumps, Inc.

77

RECORDING AND CONTROLLING INSTRUMENTS—including thermometers, pyrometers, pressure gages, voltmeters, ammeters, pH recorders, are catalogued in Bulletin W1811. The Bristol Co.

78

REFRACTORIES—Data on selection, specifications, properties, shapes, and applications of refractories are compiled in 22-page Catalog R-1-Q. Norton Co.

79

ROOFING—applied cold, by brush or spray, is the subject of 14-page booklet BK-402. The properties of the compound are discussed, and specifications of different types are outlined. Installations are pictured. The Flintkote Co., Inc.

80

ROTAMETERS—Catalog Section 27-A contains dimension drawings for designing piping layouts for Series 700 Flowrator rotameters. Different types of the indicating instruments are covered, as well as panel mounting arrangements, alarm attachments, transmitters, and accessories. Fischer & Porter Co.

81

ROTARY PUMPS—Internal bearing Gearex rotary pumps for lubricating fluids, and external-bearing models for non-lubricating fluids are presented in catalog. Detailed selection data, illustrations, cross-section views, and specifications are included. Sier-Bath Gear & Pump Co.

82

ROTARY PUMPS—General Service Type GA rotary pumps are described and illustrated in 8-page Bulletin W-484-B1. Heavy-duty Type GR rotary pumps for 500 p.s.i. are covered in 6-page Bulletin W-487-B10B. The publications contain sectional views, specifications, performance curves, and other engineering details. Worthington Pump & Machinery Corp.

83

RUBBER GLOVES AND APRONS—Catalog Section 9035 contains illustrated suggestions on how to get maximum service from acid and industrial rubber gloves. Also covers plastic-treated and plastic-sheet type industrial aprons. The B. F. Goodrich Co.

84

RUST PREVENTIVE—Liquid coating R-9 for safeguarding journals and other highly finished metal surfaces against

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American MonoRail Cranes supply overall coverage. Handling is not tied down to craneways since interlocking devices permit transfer in any direction. Free moving cranes serve every square foot of operating area. American MonoRail Cranes are available for any type of job. Low cost installation dovetails with low cost operation. They offer all the advantages of lightness, easy movement, strength, live-load capacity up to 5 tons.

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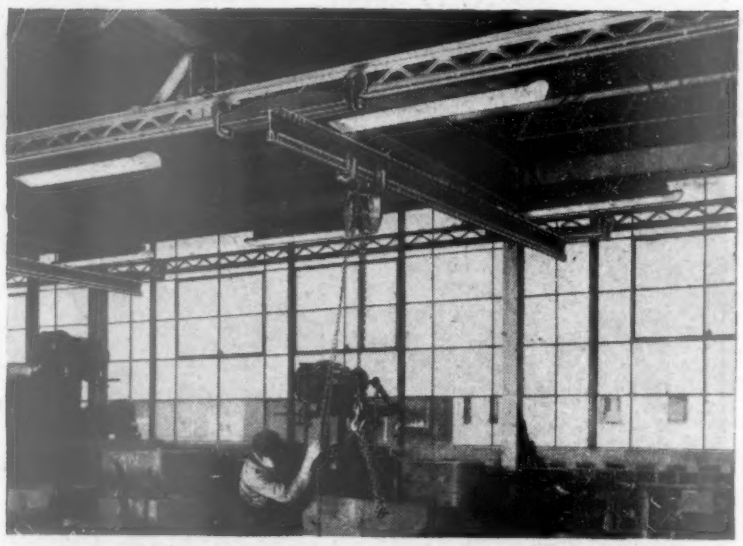

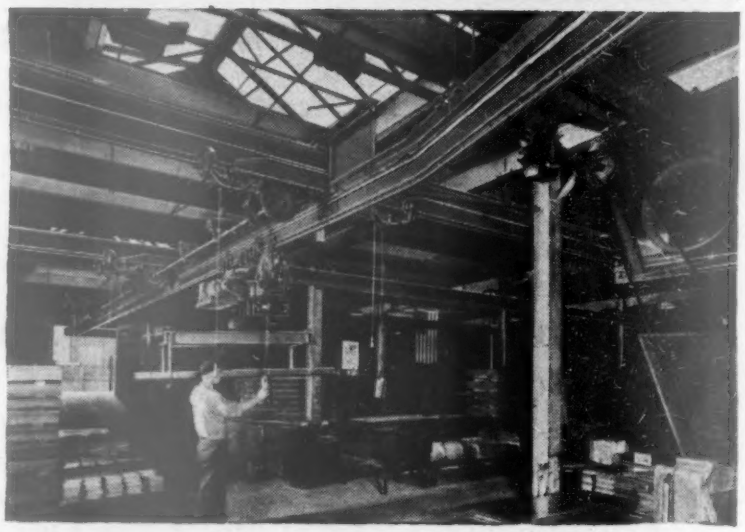

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rusting, is announced in 4-page text. Outlines characteristics and applications. Rust-Oleum Corp.

85

SELENIUM RECTIFIER EQUIPMENT—including power supplies, battery chargers, cathodic protection equipment, and other units, is set forth in 9-page booklet. Contains revised code numbers and prices. Federal Telephone & Radio Corp.

86

SILICONES—including insulating compounds, greases, fluids, varnishes and resins, and rubber, are set forth in 12-page booklet (third edition). Explains chemical properties, features, and uses. Dow Corning Corp.

87

SOLDERING TOOL—known as Thermo-Grip, and attachments are treated in 6-page folder. Photographs show the tool in use, and specifications are provided. Ideal Industries, Inc.

88

SOLENOID—rotary type, called Rotonoid, with a constant torque through 180 deg. rotation, is featured in 4-page bulletin. Gives details of construction, possible variables, and list of applications. Radio Condenser Co.

89

SOOT REMOVERS—"What Do You Know About Soot Removers?" is a 4-page folder describing ingredients used in soot removers, their function and relative effectiveness. O'Brien Industries.

90

STEAM METER—Bulletin No. 35-80B contains details of construction and installation on rotary steam meters with capacities from 250 to 12,000 pounds of condensate per hour. American District Steam Co.

91

STEEL GRAB—for handling steel plate or structural forms, is depicted in Bulletin TA-8. Discusses design, operation, sizes, capacity, and uses. Mine Safety Appliances Co.

92

STEELS—Rexalloy cast cutting tools, high speed steels, different types of tool steels, stainless steels, alloy steels, machinery, and other steels are listed in 176-page catalog. Includes data on properties and specifications. Crucible Steel Co. of America.

93

STOCK CONTROL—with the Sched-U-Graph chart board is demonstrated in 32-page booklet entitled "Dynamic Management Control with Sched-U-Graph." The record system is explained with pictures. Remington Rand Inc.

94

SUBSTATIONS—Publication GEA-4500, 78 pages, describes package substations rated from 750 to 45,000 k.v.a., for power distribution. Photographs and diagrams, as well as data on components, different arrangements, ratings, and dimensions, are provided. General Electric Co.

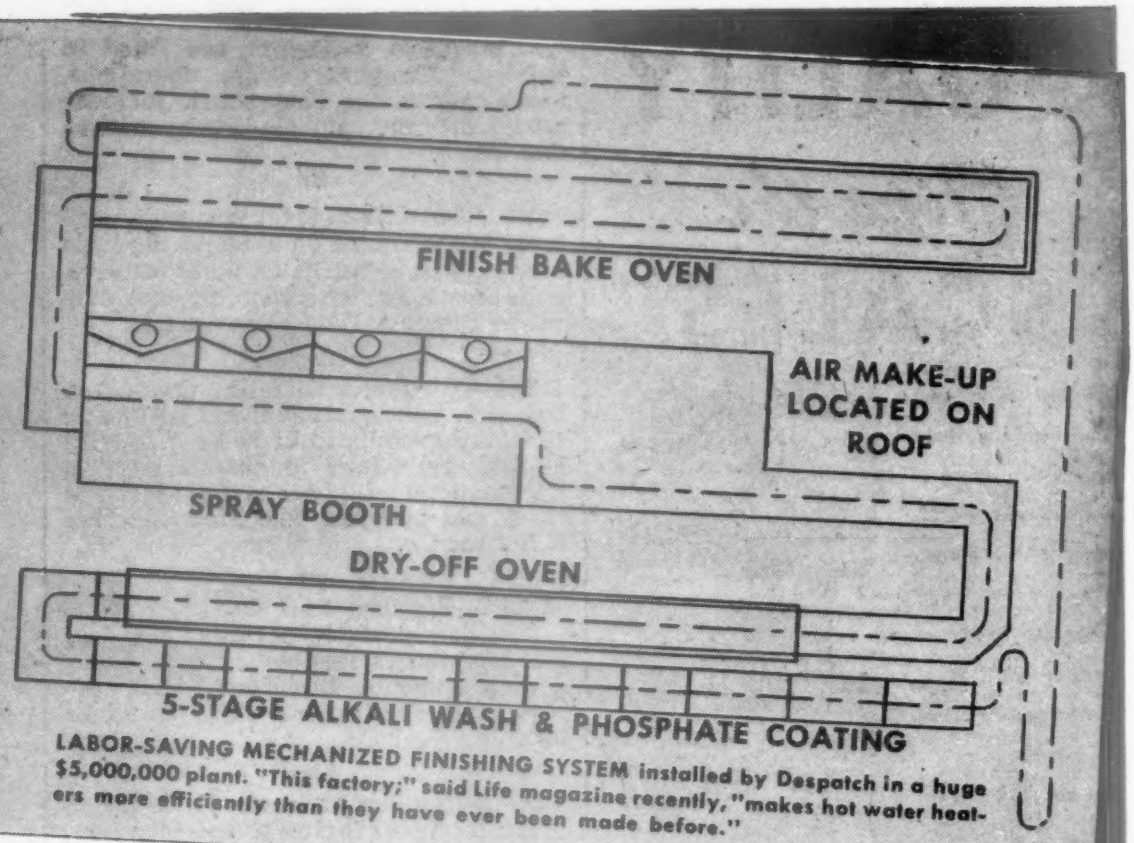
95

TEMPERATURE CONTROLS—Educational Bulletin 5 is devoted to automatic temperature control systems. Charts, tables, and diagrams explain measurement, automatic control, and selection, and process plant and control terminology are listed. Wheelco Instruments Co.

96

TIME CONTROLS—including interval timers, time switches, cycle repeaters,

LIFE says "... the most efficient factory of its kind in the world ..."



LABOR-SAVING MECHANIZED FINISHING SYSTEM installed by Despatch in a huge $5,000,000 plant. "This factory;" said Life magazine recently, "makes hot water heaters more efficiently than they have ever been made before."

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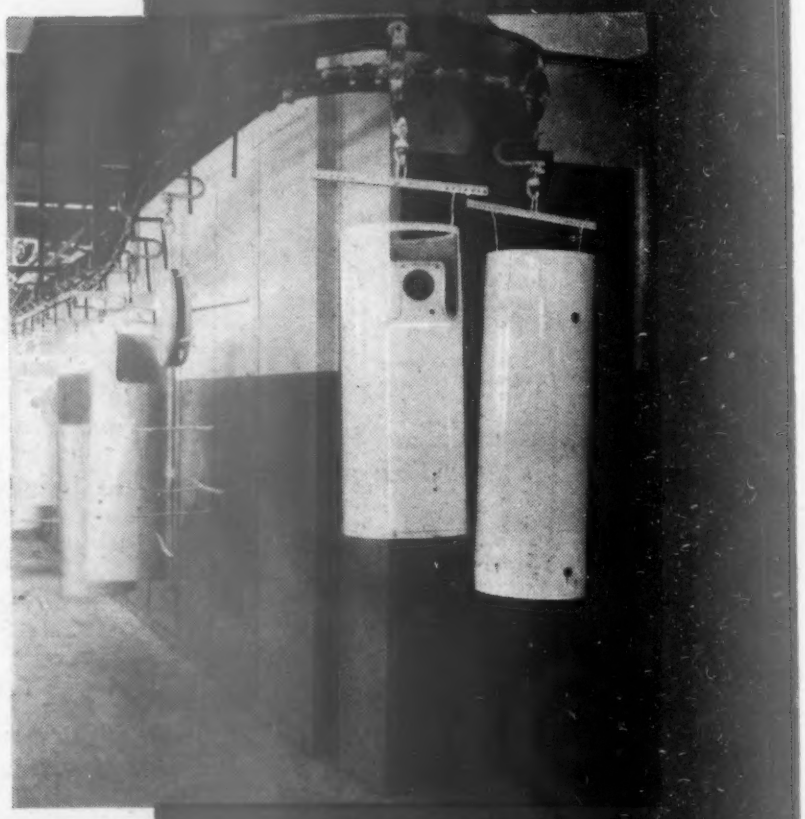

OUTLET EN[D] of Despatch Finish Baking Oven discharging hot water h[eaters] on roller guides and covers on conveyor. Conveyor mak[es] Despatch 100 ft. oven. Heat is supplied by [500,000 BTU Despatch gas burner]. WRITE FO[R ADDITIONAL DETAILS.]

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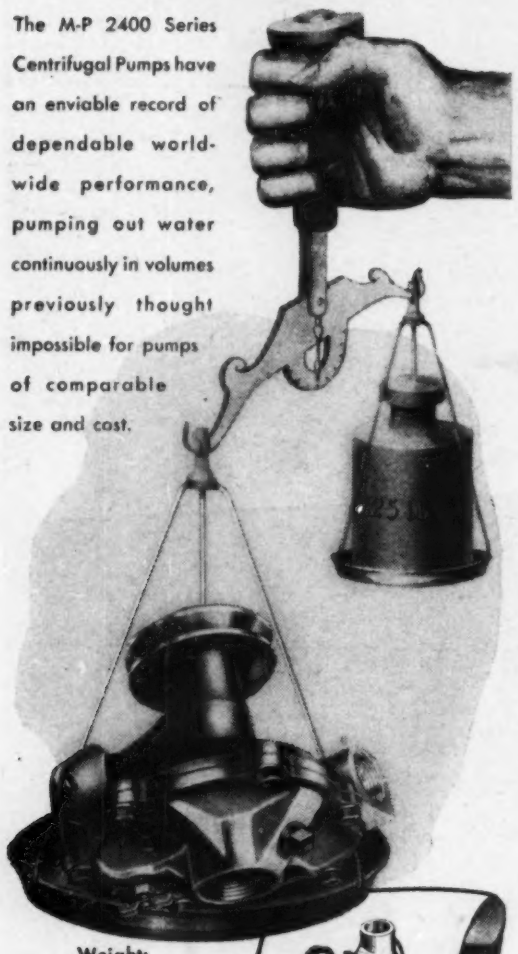

Weight: 9 lbs.

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2400C Cast Iron (Bronze Impeller) $21.50.

MODEL 3100: bronze; reversible; 150 GPM.

FLOMAX 10: portable engine; self-priming GPH 10,000.

MODEL 3610: bronze; clutch integral; C.W. or C.C.W. rotation; 130 GPM.

Easily installed, tapped for priming connection, with an intake of 1¼", discharge of 1", the M-P 2400 Series Pump employs original and unique construction on the pumping side since both the permanent and dependable sealed construction and double row bearing-shaft assembly are built for long service without the necessity of lubrication or adjustment.

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and magnetic contactors, are listed in catalog. Explains design, operations, specifications, and lists prices. Includes wiring diagram symbols. Paragon Electric Co.

97

TIME RECORDER—for registering employees' work time on cards, is the topic of 4-page Bulletin 123. Outlines features, and illustrates the recorder and time cards. Simplex Time Recorder Co.

98

TIRES—of rubber, including pressed-on industrial solids, cushion, and pneumatic tires, are introduced in 32-page Catalog M-609. Tells how to change over to pneumatic, and gives sizes, specifications, and pictures. The Firestone Tire & Rubber Co.

99

TOOLS—Electric Tool Catalog 3, 32 pages, lists portable power drills, drill stands, grinders, flexible shaft machines, and attachments. Describes design, ratings, and applications. The Bradford Machine Tool Co.

100

TOOLS—Catalog 26 (revised), 60 pages, presents descriptions, specifications, prices, and pictures of tools for motor maintenance, electrical maintenance, safety equipment, mechanical maintenance, and other applications. The Martindale Electric Co.

101

TRANSMISSION BELTING—Specifications and construction of Monarch transmission belting are outlined in 4-page folder. Applications are explained. Hewitt Rubber Div., Hewitt-Robins, Inc.

102

TREATMENT OF COLDS—as well as muscular aches and pains, minor throat irritations, and headaches accompanying colds, with a medication named Formula A-N-1 is outlined in 6-page pamphlet. Benson Laboratories, Inc.

103

TUBE CUTTER—Four-page Bulletin A44 presents description and application data on hand-operated tube-cutting tool. Also tells about tube fabricating tools and service. The Parker Appliance Co.

104

TURBO COMPRESSORS—for agitation and blowing of acid tanks, flotation, and other applications, are treated in 4-page Bulletin No. 142, Section 3. Summarizes characteristics, pressures, volume, and applications, and illustrations show design and structure. Spencer Turbine Co.

105

V-BELTS—"V-Belt Handbook for Industrial Applications" is the title of 74-page catalog providing information on construction, stock drives, standard drives, V-flat drives, special types, sheave specifications, and prices. Catalog Section 2170 deals with multi-V-belts, and No. 2175 covers Magic-Grip sheaves. The B. F. Goodrich Co.

106

VACUUM—for pneumatic conveying equipment, is the subject of 4-page Bulletin 143, Section 3. Outlines capacities, functions, maintenance, and design drawings and installation photographs are included. The Spencer Turbine Co.

107

VALVES—Catalog 97, 12 pages, contains engineering data on packless and packed valves, strainers, driers, and other accessories. Catalog 65 deals with ammonia

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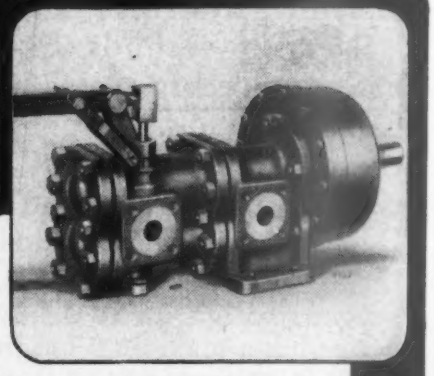

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